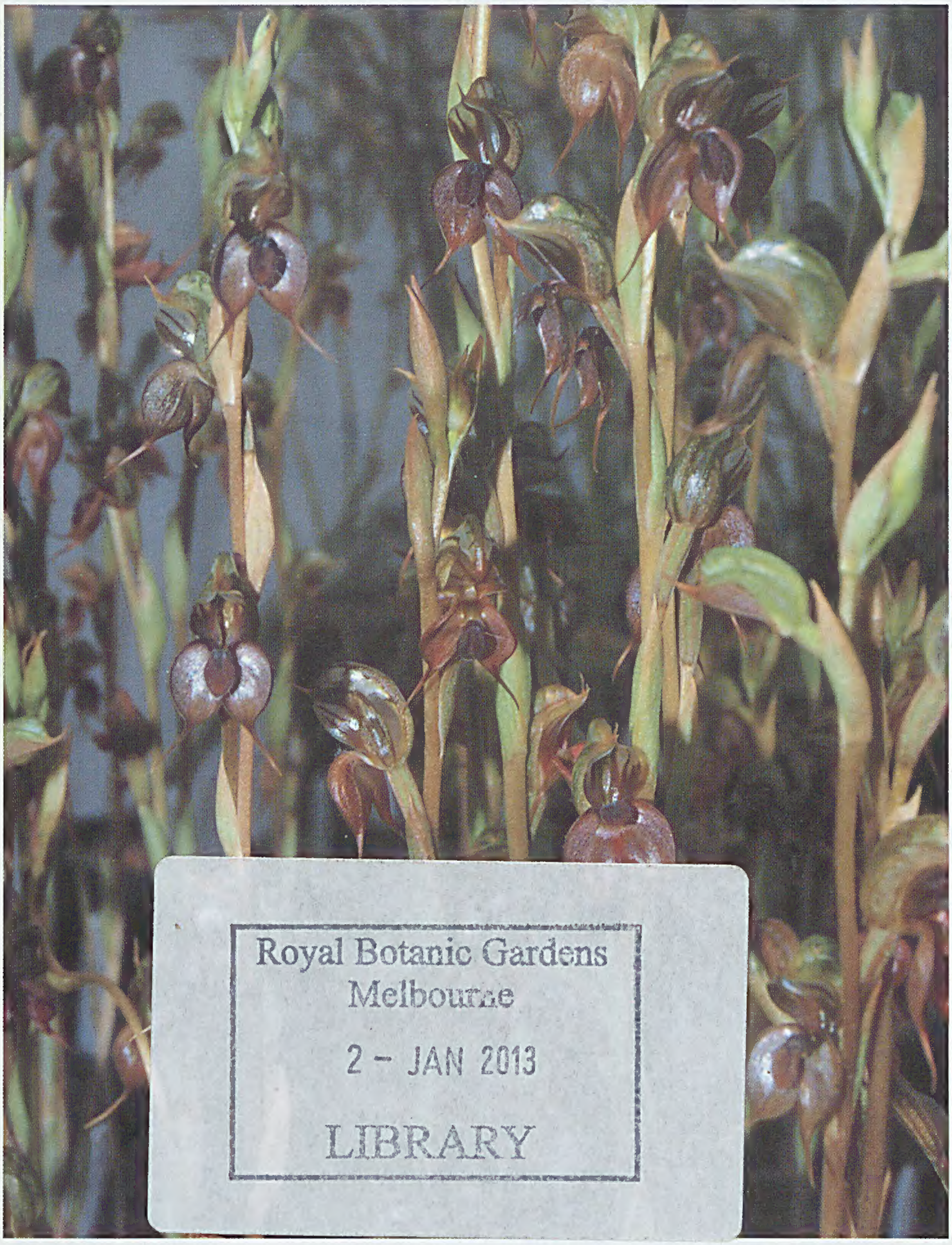
The Orchadian

Volume 17, Number 6 www.anos.org.au December 2012

Official Journal of the Australasian Native Orchid Society



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Pterostylis saxicola, an endangered species in cultivation at the Australian Botanical Gardens, Mt Annan where work is being undertaken to study ex-situ conservation and seed storage. (Photograph, Greg Steenbeeke)

The Orchadian

Official Journal of the Australasian Native Orchid Society Inc.
Founded August 1963
www.anos.org.au
Dedicated to the Study and Conservation of Australasian Native Orchids
Print Post Approved: PP239628/00002, ISSN 0474-3342
Patron: David Cannon

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Subscription Rates (in AUD$)

Australia	$50
Asia/Pacific	$60
Rest of World	$70

Refer to www.austpost.com.au for application of international postage rates.

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Advertising Costs per Four Issues,
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Editorial

Welcome to a somewhat re-jigged version of the journal. Ian arranged a number of changes during his term as editor, including the opportunity to use more colour throughout the journal. I hope that I will have the guidance, and particularly the support of the members to continue to improve this vital organ which gives our orchids a voice.

In discussion with Peter Weston he mentioned that I may be the first practicing scientist who has held the helm. It made me realise that, while many of you may have seen my name, you may not be aware of my history. I grew up in Sydney and the Blue Mountains, studying vegetation ecology at the University of Sydney. This was followed with working at the Macquarie Marshes in western NSW, throughout the Clarence Catchment in northern NSW, and later across the border in southeastern Queensland. I have been involved in large vegetation mapping projects in the northern inland of NSW, throughout the western Blue Mountains and in the greater Sydney area. Currently I work as a threatened species manager and planner, working with the threatened vegetation and species in the greater Sydney region. With regards to ANOS I have been (and remain) a member of the Sydney and Macarthur groups since 1992, and I have been an ANOS Judge since the mid 1990s.

This issue contains reports on the Sarcochilus Show held by ANOS Illawarra and the Spring Show held by KABI Group, an outing south of Perth with the president and new photos of a New Zealander in Australia. There is a report on a brief trip made to the southern coast of NSW and some interesting orchids that turned up, and the Conservation Officer shows us what goes missing when dealing with managing cemeteries for aesthetics.

We also have one of the papers presented by students in the NSW Judging group who just got their 1st stage 'wings' - an assessment of conservation of terrestrial orchids. Part five of descriptions of new species from New Guinea in the genus *Agrostophyllum* are also included.

I hope that you enjoy my first attempt, and can help me to produce a better issue next time!

Greg Steenbeeke

President's Report

Rick Winch (rickwinch@westnet.com.au)

Congratulations and welcome to those new Members on the ANOS Council and Councillors that were elected following the AGM held in Kempsey on Saturday the 1st September during the very successful Speciosum Spectacular hosted by the Walmsley Family, certainly an event not to be missed.

ANOS welcomes a new Editor of the Orchadian, in Greg Steenbeeke who replaces Ian Chalmers, and my sincere thanks are extended to Ian for the sterling job he completed during his time. For those Members who do not know Greg, he is a newly qualified ANOS Judge, and his photography is extremely good. Check out his pages on the web.

The recent ANOS Committee Meeting to review the 'draft' Constitution decided that it would be best to meet 'face to face' in Sydney in early February 2013 to finalise the full 'draft' to be presented to the 2013 ANOS AGM that will be held in conjunction with the ANOS Conference to be held in Brisbane. This action is well overdue and will streamline the operations of ANOS into the future.

WA recently hosted the AOC Conference at the Crown (Burswood) Casino, and it was very satisfying to meet up with many fellow ANOS Members during and after the Conference.

By now most of the ANOS Group Shows will have been completed and my congratulations are extended to those members who were successful in winning prizes.

Don't forget to have your plants nominated for the Ira Butler, Bill Murdoch and G Herman Slade Trophies, conditions available at http://www.irabutlertrophy.org/

May I wish all Members a very Happy and safe Christmas, and a prosperous New Year for you and your families.

Photo by Rick Winch, *Caladenia procera.*

10TH OPEN AUSTRALASIAN NATIVE ORCHID SHOW
Hosted by ANOS (QLD) Kabi Group Inc.

Photographs by Jon Cara.

The 10th Open Australasian Native Orchid Show was held over the weekend of the 25 – 26 August. Once again, we had a very successful show attracting entries from Toowoomba, Sunshine Coast, private individuals as well as our club members. The weather was kind to us – warm and sunny, which we hope will repeat itself when we host the 7th ANOS Conference and Show in 2013. The show was officially opened by Councillor Mike Charlton continuing a long and positive association with Moreton Bay Regional Council.

Despite an unusual growing season, members filled the benches with a great display of species and hybrids. The ANOS Judging Panel did a fine job and for this we are most grateful.

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The Saturday morning judging coincides with a farmers' market at the Lawnton Showgrounds and shoppers are always keen to gain admittance and view the beautiful plants. It is a credit to the judges that they can work around this inconvenience.

The Champion Hybrid was ***Dendrobium* Cherry Dance** owned by Robert Reitano and was awarded a HCC. Robert is certainly making a name for himself at local shows and I anticipate he will make his presence felt at next years' ANOS Show. Ross and Rhonda Harvey's ***Dendrobium speciosum* var. *grandiflorum*** was chosen as Champion Specimen. Ross added to his trophies with another plant of *Dendrobium speciosum* var. *grandiflorum* which was the judges' choice for Champion Species. Over the years, Ross has been a prolific winner at the Kabi Shows which puts him up alongside the leading growers of Australasian Native Orchids.

The show schedule was fully sponsored prior to the show, thanks to our loyal supporters. An innovative move this year was to include an additional Class for Table Top Displays to give our members some exposure to this before the "Big One" next year.

We look forward to hosting the 7th ANOS Conference and Show at Strathpine in 2013, renewing old acquaintances and meeting new friends.

Eddie Boudette
Asst. Show Organiser

ANOS Illawarra Sarcochilus Show 2012

It was business as usual in Wollongong in mid-October for our Sarcochilus Show, which I unashamedly promote as my preferred show. It is I believe more colourful than the spring show despite being based on a single genus. Hybridists in recent years have provide growers with a wealth of colour, size and shape, which blends well with the show venue overlooking Wollongong Harbour and the regular stream of walkers, joggers and of course orchid aficionados. A slightly better than average number of plants were benched (240) and many of these were in the ever growing seedling section, which is a good sign for future years.

This year was average in many ways but the average show of this type is very good and there is always something special to see. The combination of ***Sarco.* Heidi x *spathulatus*** was a prime example and it has a Grand Champion prize as proof. Thirty flowers more brown than red on five racemes displayed the caring culture of John Douglas. Phil Barrett is also known for his growing qualities and won the Gwen Gough Memorial Trophy with *Sarco. hartmannii* 'Hi Ho' x 'BS'. The plant produced 10 racemes of well shaped white flowers with red centres, which is required to win this prize. Phil also contributed with another champion in the Sarcanthinae Seedling. This was *Sarco*. George Colthup 'Bill' x Charm 'Red', a flower of a different white texture and larger darker red centre.

Champion Native Species was won by John Frecklington, normally responsible for benching first rate plants of *Dendrobium kingianum* but the *Sarco. fitzgeraldii* he showed had evenly mottled pink flowers of a delicate texture.

One member who always manages to prevail in the list of champions is John Hynds who won Champion Species Seedling with a very well shaped *Sarco. hartmannii*. The plant was what many would term a standard type plant but I would like to see this plant in a

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couple of years with many more flowers of this quality.

One exhibitor who must be mentioned is Rob Trevenar, who in my opinion benched some of the best prepared plants I have seen for some time, although the name of one caused some investigation. Rob won the prize for Best Cultured Orchid with ***Hymenaria fitzalanii*** (formerly *Eria*) and that is the name which required some research, however he could easily have won that prize with his plant of *Bulbophyllum graveolens.* It must have been a close call as *H. fitzalanii* displayed 50 small cream to creamy yellow flowers on several arching racemes and *B. graveolens* consisted of typical large yellow-green flowers with a striking, glossy red, furled labellum.

ANOS Illawarra is a small but keen group and the support by members for our shows is very good and we feel The Old Courthouse at Belmore Basin is the best show venue available.

Alan Stephenson
President, ANOS Illawarra

(Photographs by Greg Steenbeeke, plant names **bold** in text)

An Unexpected Orchid Find South of Sydney

Jim Cootes and George Tiong

In mid October 2012, the authors had the pleasure of the company of Alan Stephenson, when we went orchid-hunting, for photography purposes, around the Shoalhaven River city of Nowra, about 160 kilometres south of Sydney.

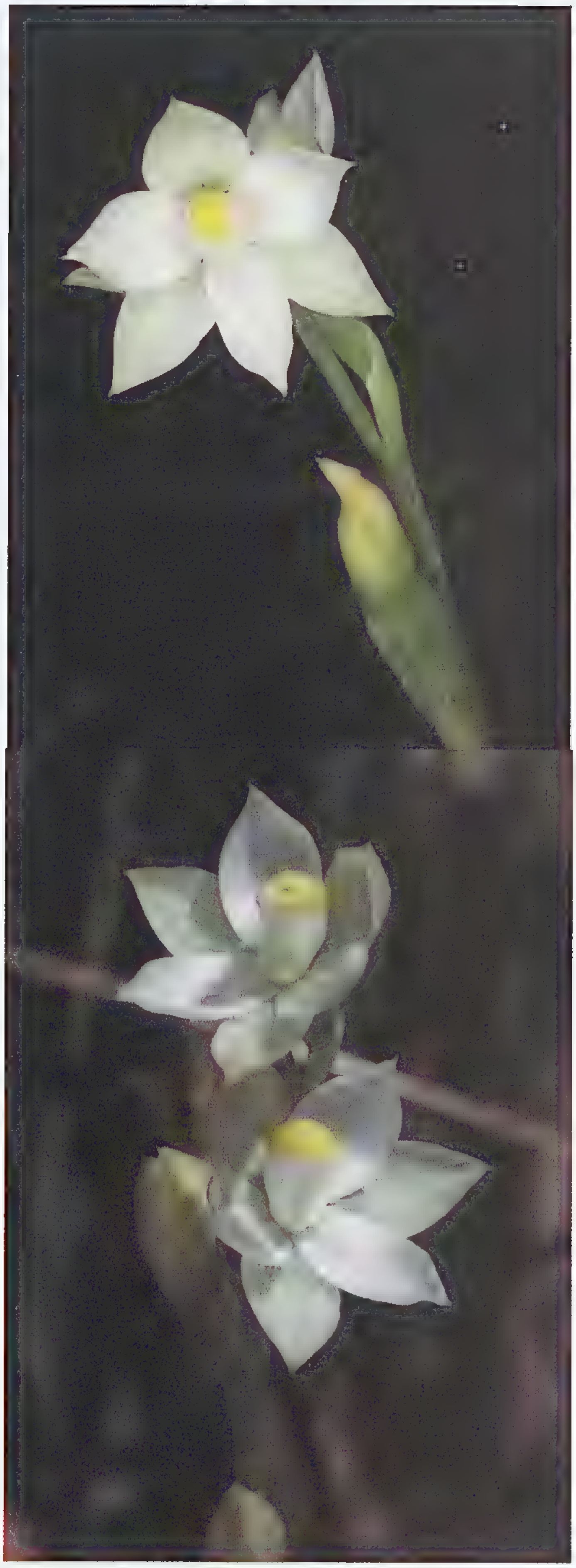
The Shoalhaven region covers some 4600 square kilometres, and starts from Berry in the north to near Batemans Bay in the south, a distance of about 130 kilometres along the highway, and stretches up to nearly 70 kilometres inland. The geological landscape here consists of Permian siltstone, sandstone, shale and conglomerate of the Shoalhaven Group and the Clyde Coal Measures. The diversity of topographic environments of the area is reflected in the wide array of landforms, from mountains with rocky plateaux and escarpments intersected by gorges, to swamps, coastal dunes and plains. This region is typical terrestrial orchid country, comprising a variety of habitats ranging from closed rainforests and dry sclerophyll forests, to grassy woodland, heath and scrubland, which support diverse communities of orchid species, which can be found in the south-eastern region of Australia.

Upon arrival, we were interested to find out about the Purple Donkey Orchid, *Diuris punctata*, which was known to grow in the Nowra general cemetery. Much to the annoyance of Alan, who has the conservation of all orchid species as one of his top priorities, they had been mowed down by the local council workers the previous week. Alan informed us that he knew where there was a single flowering plant of *Diuris punctata*, so off we went and the plant was duly located and photographed. This is a beautiful species, with large purple to lilac flowers measuring about 4 cm tall, which have a yellow patch at the base of the labellum, and sit atop a scape measuring 20-60 cm.

The next place we visited was an area of open grassland and small shrubs, under high voltage electricity cables, where the undergrowth is kept low, and to see any orchid species flowering here is not of any great difficulty. Unfortunately there was a paucity of orchids flowering and all we saw were a couple of plants of the Golden Donkey Orchid, *Diuris aurea*. This is a tall graceful plant, to 60 cm high, with large flowers with golden yellow petals which are lightly marked with brown. A few months earlier, during August 2012, in the same location, there were numerous plants of *Glossodia major*, *Glossodia minor*, *Cyanicula caerulea*, as well as a couple of *Diuris* species. In the intervening months, according to Alan, little or no rain has fallen, and this could be one of the reasons for the lack of flowering orchids to be seen.

The next stop was in a similar type of locality, with flowering orchids being very few and far between. The only species that we found was a single plant of the Slender Sun Orchid, *Thelymitra pauciflora*, bearing a single flower on its blue-grey inflorescence. This is a widespread species, which is variable in habit and colour, and is of shorter stature at about 30 cm tall.

Our third stop proved to be much more rewarding, even though the vegetation was similar to the previous localities. We were walking around amongst the low shrubs and grasses when we got an excited call from Alan, who was a little distance from us. Upon our arrival we were shown a pair of small white flowers, and upon closer examination we realised that Alan had found a milky-white coloured form of *Thelymitra pauciflora*. The normal colour for *Thelymitra pauciflora* is pale blue with brownish overlays. The flowers are not big, at about 12 to 15 mm across the widest point. The inflorescence is upright and can bear up to 4 blooms. A second plant, bearing the same milky-white blooms was found a couple of metres from the first specimen. The plants grow in well draining, very sandy



Two different clones of white-flowered *Thelymitra pauciflora*.

Photographs: Jim Cootes

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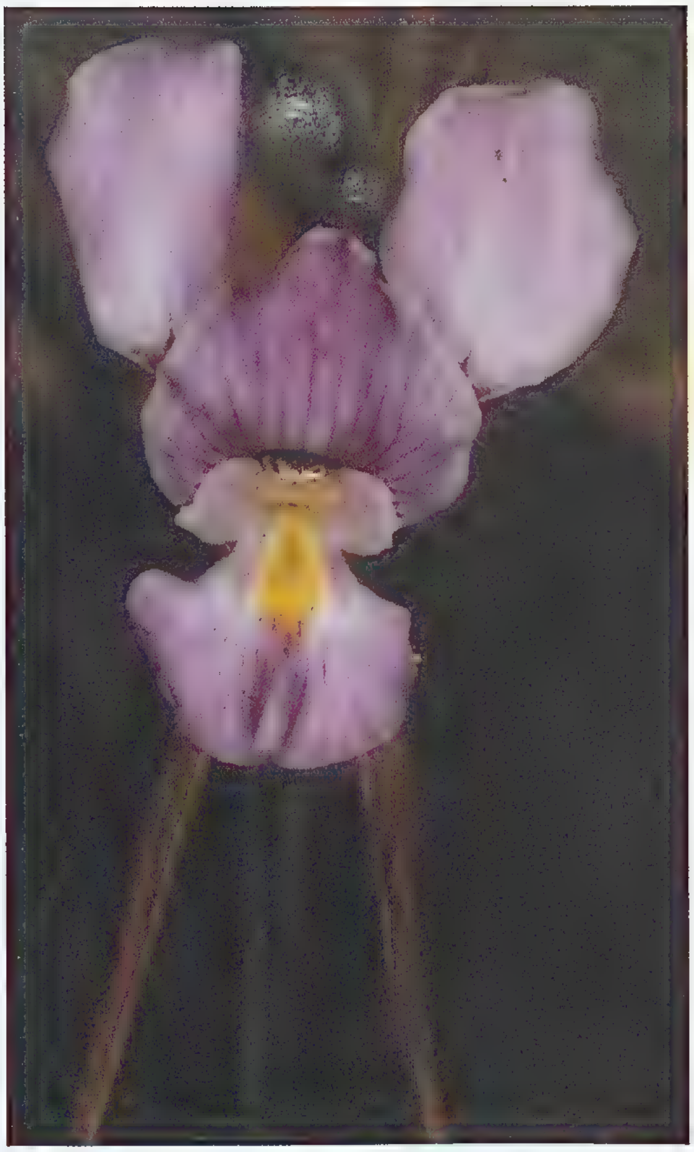

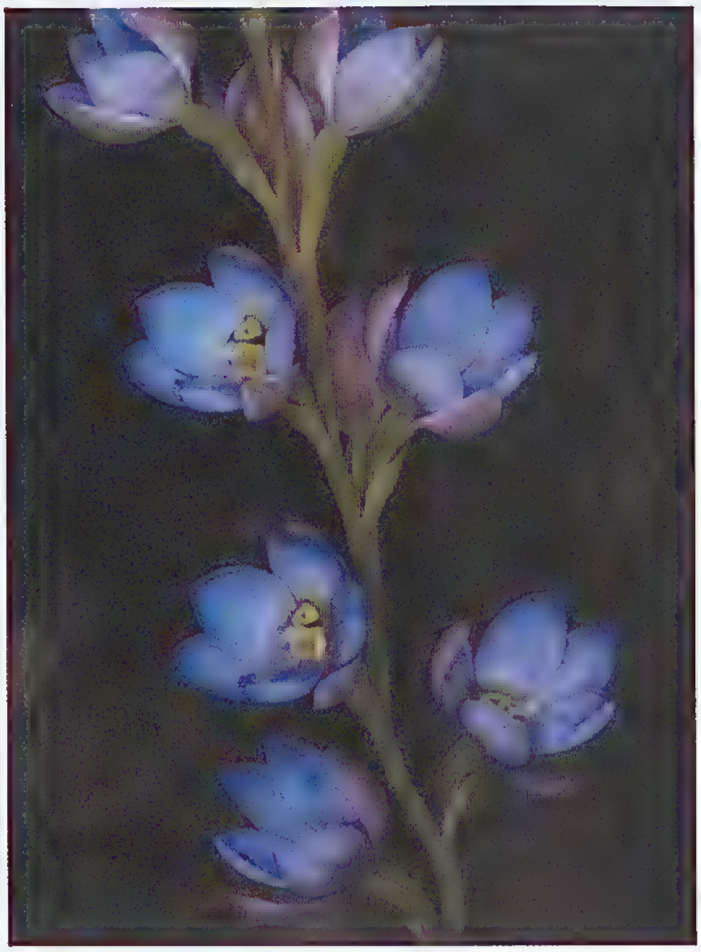

soil in very bright light. Some distance from the *Thelymitra pauciflora*, we came across the distinctive looking *Calochilus platychilus*, with its purplish beard or hairs covering the enlarged labellum.

At another location, beside a bush track amongst grasses and sedges, a number of the magnificent looking King Greenhood, *Pterostylis baptistii*, could be seen. In recent years this has become a significant colony; however, a combination of the dry spell and damage caused by a bogged vehicle in the vicinity could have contributed to a decline in the present numbers.

Our final encounter was with the handsome looking Tall Sun Orchid, *Thelymitra media*, standing tall in a grassy patch adjacent to large trees beside the road. This impressive orchid has a stout scape, measuring about 90 cm in height, and bears 5-30 flowers which are coloured a bright blue, each measuring about 3 cm across. The central column is distinguished by a blackish colour band below the yellowish top, and two white hair tufts.

A day in the bush is always a most enjoyable way to spend a sunny weekend. The fresh air and the connection with nature can only be beneficial. And if one gets lucky and finds a plant as special as the white form of *Thelymitra pauciflora*, then that is an added bonus.

Acknowledgement: Our sincere thanks to Alan Stephenson for being our guide for a very special day in the bush around Nowra.

Opposite Page:

Calochilus platychilus (top left)
Diuris punctata (top right)
Thelymitra media (lower right)
Thelymitra pauciflora (lower left)

All photographs by Jim Cootes

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Editor's note: the allocation of the *Calochilus* species to *C. platychilus* Jones is not yet accepted by NSW Herbarium, which allocates material to *C. robertsonii* Benth.

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Now You See Them, Now You Don't

(Or how we continued mowing and blamed the casual staff)

Alan Stephenson, ANOS Conservation Officer (affine@tpg.net.au)

I first contacted a particular local council in 1999 about several hundred plants of *Diuris punctata* which were growing in a cemetery under their control. The intent was to try and maintain the population by protecting the plants from regular mowing. I contacted a councilor I knew quite well, explained the situation and she arranged a meeting with the General Manager. At the meeting I explained the orchid was not listed under any state or federal environment legislation but as it is a desirable plant I felt the population should be protected if that was possible, having consideration for general cemetery maintenance and appearance.

The meeting was positive and the General Manager said he would contact the relevant senior staff person. This was done but the letter I received showed a distinct lack of orchid knowledge which was also odd considering the quality of certain council personnel at the time. A response from the senior staff person stated his opinion the orchid was most likely introduced to the cemetery by a relative of a deceased person and survived. Can you believe this man was paid about $100,000 per year to tell me that nonsense? That person retired several years ago and was elected as a councilor in the recent local government elections.

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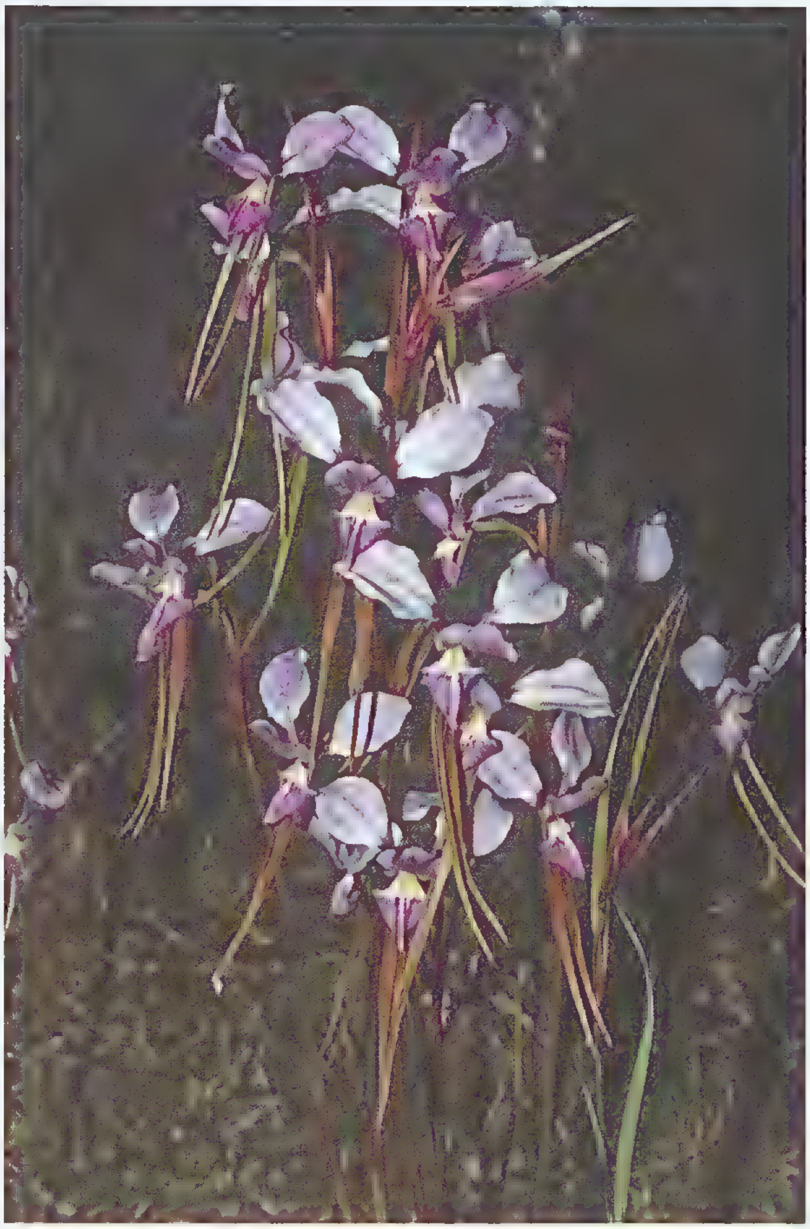
All went well for several years but on a regular visit I noted the area had been mowed and again I contacted council and was informed the error was due to a casual employee. In previous years, vegetable dye markings have been used to delineate the colonies and mowing was not undertaken until plants had flowered, capsules had set and dehiscence was completed. However, 2012 saw a system failure and plants were again mowed while in full flower. I called to the Cemeteries Manager who explained to me once again (in true management style) that casual staff had perpetrated the damage. In an attempt to overcome this difficulty, an on-site meeting was planned with the manager and the extent of the population was formally listed and recorded on a permanent log so future system failures do not occur. At a further on-site meeting in November 2012, I met with the Cemeteries Manager and a works foreman to discuss the matter of mowing.

The works foreman was initially aggressive and not conducive to a temporary hold on mowing but we eventually came to an agreement not to mow during October. While not a perfect solution, I feel sufficient plants will flower, achieve pollination and allow capsules to progress to dehiscence, which will assure the continued presence of this species.

In a similar situation at another cemetery almost 100 km distant, I met in 2011 with another Cemetery Manager for the same purpose. The tone this meeting was quite positive as fortunately the cemetery concerned is a small regional cemetery and mowing was only undertaken at certain times. These were for Mother's Day, Father's Day and Christmas. It was explained to me the relatives prefer to attend to graves at these times and the area should be clear and as attractive as possible. Both cemeteries have been constructed in hard non-arable ground and the growth of grass is never likely to be a problem at either.

To my dismay in 2012 this regional cemetery had been mowed in mid October, which is two months earlier than the manager had promised. Between the actual mowing and the promised mowing, grass might have grown less than 2-3 cm, particularly notable at that time of year when rainfall, in this already low rainfall area would be minimal. When contacted, this manager at least had the intestinal fortitude to accept responsibility without resorting to passing the blame to casual staff. He explained his position with the council had changed and cemeteries were no longer his responsibility but stated he would contact the person now in charge and properly record the preferred mowing time. From an estimated population of more than 400 plants, two poor and fading orchids remained for the group of botanical artists who travelled to the



site to witness the orchids in flower with the expectation of taking photos, drawing and painting them.

Further up the coast of New South Wales another anomaly occurred. On the road verge of a secondary but busy road were numerous plants of *Diuris praecox* (Vulnerable Species) and *Diuris bracteata* (Endangered Species) the presence of which the local council was unaware. Both species went the way of the mower along with the more common *Lyperanthus suaveolens* and some emerging *Calochilus* species.

The moral of the story is that the occurrence of any orchid which is either endangered, uncommon or special to a particular area, must not be considered to be the property of any of us who occasionally or regularly get out and about, either because we like to take photos or to involve ourselves with orchids in a more formal way. Any such knowledge should be noted with your nearest branch of the Office of Environment and Heritage (OEH) [see Editors Note] and the Threatened Species Officer of your local council. It should be remembered most orchid enthusiasts have more knowledge

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Diuris punctata in the cemetery (right) and adjacent to one of the graves (below).

than authorities, especially regarding specific locations, but this must not be treated as top secret as orchids can be lost when information dies with the owner of that information.

Following proper recording of all of the above, the next step is to assure both bodies that you require them to inform you of any action they intend to take, in order to let them know someone is looking over their shoulder. This is essential even though none of us has any official position of influence or authority but regular and polite harassment of these officials should be considered proper practice in these instances. It is necessary for you to let them know you care and the value you place on something which in most instances has no commercial value. Even then, be prepared for occasional setbacks, as bureaucracy will fail you on a regular basis. From this you will learn when to be diplomatic and when and who to poke with a sharp stick.

Editor's Note: Records for any plant or animal seen in NSW can be recorded in the NSW Government's Bionet system (http://bionet.nsw.gov.au) which is the upgraded version of the Wildlife Atlas and can do away with needing to send your records into the Office of Environment and Heritage. You can obtain a user login for the system and then submit your own records using the downloadable spread-sheet, or email location, date, species, count and flowering details to OEH staff at atlas@environment.nsw.gov.au. These records are maintained as part of the system that is centrally stored and backed up. Any orchid records are automatically 'denatured' when shown publicly on the web portal, so no exact locations are given to the general user. Licensed users (such as councils and some consultants) can see the data in the original form (as accurate as you decide), and use that information for management, planning and surveys. I urge you to get involved!

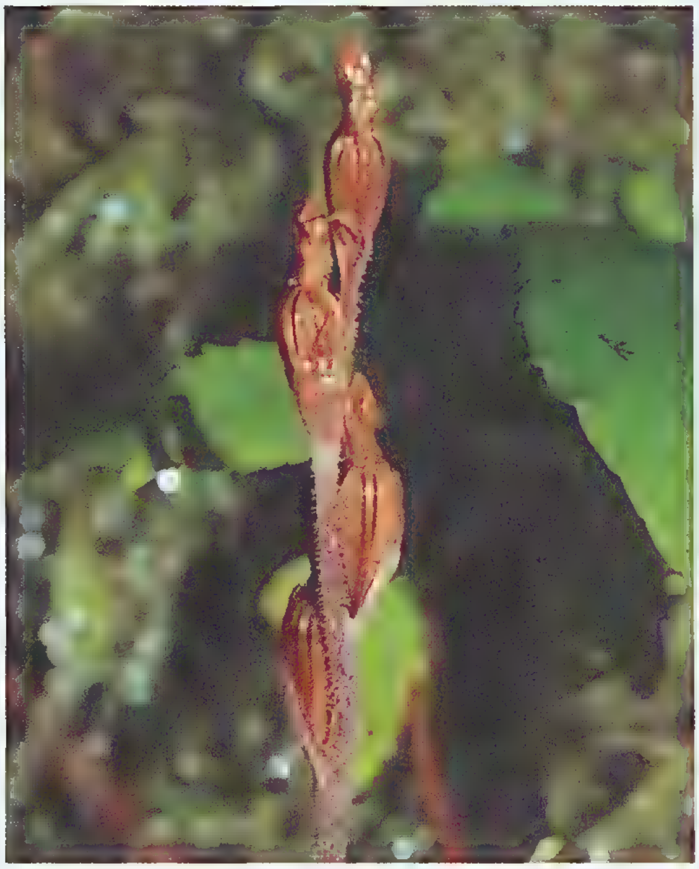
Danhatchia australis - Not just a New Zealand Species

Text and photographs by Greg Steenbeeke (ozorchids@dodo.com.au)

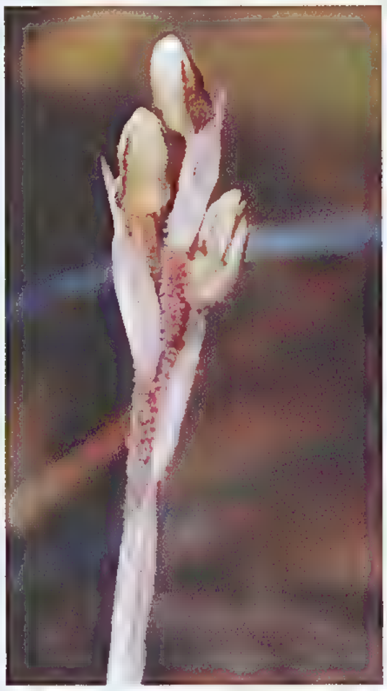
Early in 2012, I journeyed to the NSW Southern Highlands village of Bundanoon, following up the type location of a small, mycoheterotrophic plant called *Thismia clavarioides* which Colin Hunt and I thought we had found in Blackheath in the upper Blue Mountains. This small herb lives in the upper layers of the soil and has short-lived flowers among the leaf little. Andrew Harvie, a long-standing friend and companion on orchid hunting trips, came with us to Bundanoon.

While looking in other locations for the *Thismia* near the type location I was scouting a steep slope when I stumbled on some capsules on a slender, pinkish-brown stem. The fruit were clearly orchid, but matched nothing with which I was familiar.

We identified the plant as *Danhatchia australis* using Dawson & Lucas (2000) and forecast revisiting the site the next summer to see it in flower. It had recently also been noted in Comboyne, inland from the NSW Mid North Coast.



Late November 2012 we three returned to the site with Alan Stephenson and found it to be evident again, but we were too early - but we will return to catch it in flower!



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7th ANOS Conference & Show Update

As 2012 draws rapidly to a close, the Kabi Group is focussed on the Conference & Show in August 2013. All pieces of the jigsaw are falling into place and we are confident that our plans will ensure the success of the event. Our Sub-committees and Conference Management Committee have met on a regular basis to identify actions, discuss issues and resolve problems. It has been a busy year for fund raising and Kabi members have supported these activities admirably.

The information on our website http://www.ourshopfront.com/kabi is current but is being updated as the need arises. We have selected seven of our Guest Speakers and discussions are continuing with a number of other prominent people. These names will be included on our website as they are finalised. From discussions I have had with people locally and interstate, there is no doubt a great deal of interest in this event. We have agreed on a generous discounted Early Bird Registration fee which ends on 31/01/2013 and recommend that you register early so as not to miss this offer. Letters have been sent out to a number of vendors seeking Expression of Interest and we are still waiting on replies.

We would like to hear from any ANOS Group or other Orchid Society that intends to mount a display as this would help with the planning for the layout of the Display Area. We still have plenty of capacity for sponsorship of our Show Schedule, whatever the amount. If you wish to support us in this manner please contact our Show Organiser, Ross Harvey, whose details are on our website.

Plans for the Opening Cocktail Party and Banquet are pretty well set in concrete. We are hoping to hold both functions on site but this will be determined by attendance numbers for the Banquet. The official opening will be performed by the Mayor of the Moreton Bay Regional Council which has been a major sponsor and supporter of the Conference and Show. We are conscious that 2013 is the 50th Anniversary of ANOS and will celebrate this in an appropriate manner.

There will be further articles in the 3 Australian orchid magazines in the early months of 2013 for people who do not have access to the Internet. If you wish to speak personally to me or our Secretary, Marilyn Corbin, we would be happy to hear from you and our contact details are on the website.

We look forward to hosting the 7th ANOS Conference and Show in 2013 and providing a happy and friendly environment for all our visitors.

Eddie Boudette

Conference Chairperson

Email: edboudette@aapt.net.au

Promoting Conservation of Endangered Australian Terrestrial Orchids by Improving Their Cultivation Methods

K. Yin Chan and Sau-wan Chan (kyswchan@bigpond.net.au)

Background and rationale

In Australia, the number of terrestrial orchid species exceeds that of the epiphytic orchids by a ratio of >3 to 1 (Jones 2006). Many of them are very attractive, colourful, floriferous and botanically unique. However, they are by far less popular amongst orchid growers and are even obscure amongst the general public. In major orchid shows, including the ANOS shows, only a small fraction of the exhibits are terrestrial. For example, in the 2010 ANOS Conference in Newcastle only 67 out of a total of 587 exhibits nominated for judging were terrestrial, i.e. only about 10%. On the other hand, survival of many indigenous terrestrial orchids is being threatened in their natural habitats. For example, of the 76 orchid entities classified as "threatened" in NSW, 66 (i.e. ~90%) are terrestrial orchids (OEH 2012). Importance of conservation of Australian terrestrial orchids is being recognized and is receiving increasing attention.

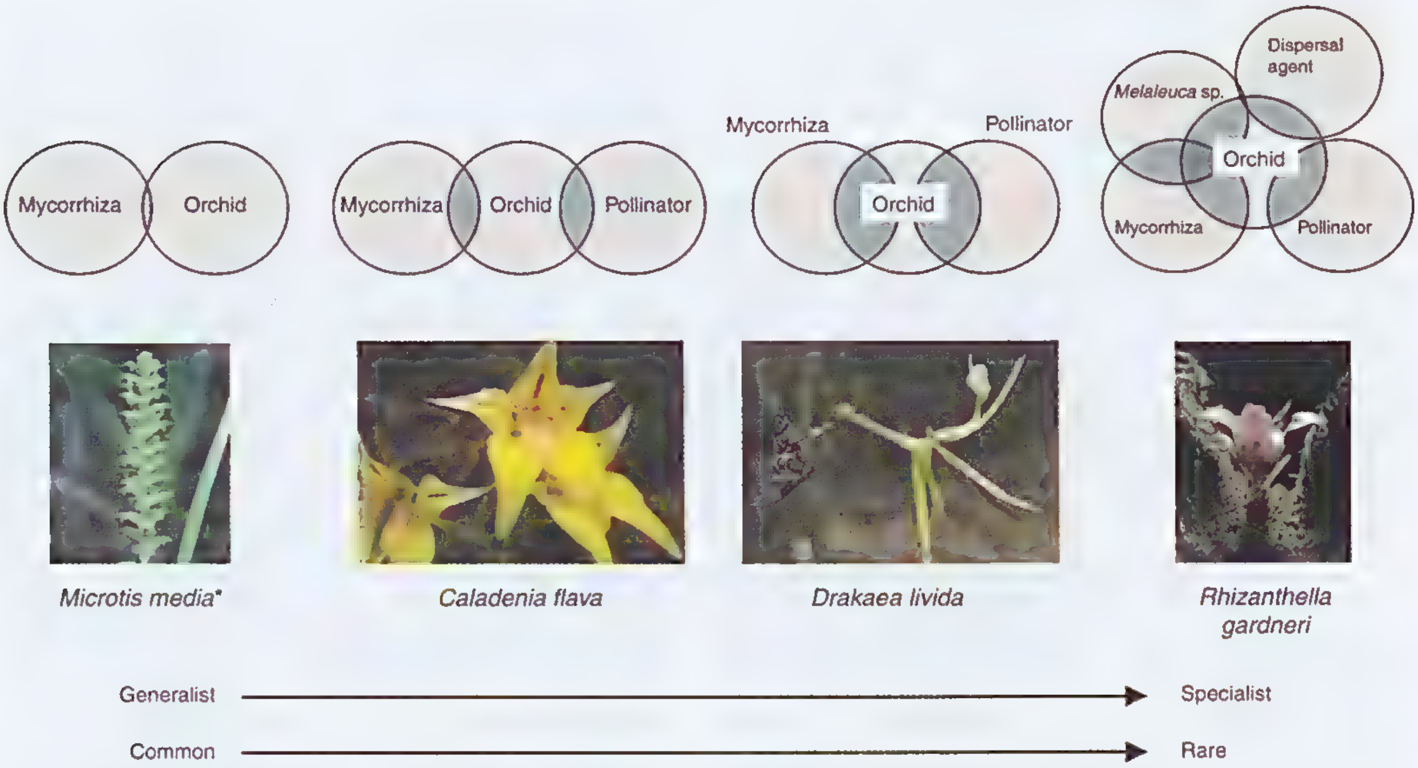
Against this background, our investigation has three objectives:

1. Provides a summary of current progress on conservation of terrestrial orchids.
2. Presents the case for "conservation by cultivation".

Identifies areas of improvement for growing Australian terrestrial orchids in cultivation.

Causes of terrestrial orchids demise

This is mainly the direct result of loss of



*Microtis media**

Caladenia flava

Drakaea livida

Rhizanthella gardneri

Fig. 1 Variation in dependence on mycorrhizal fungi of terrestrial orchids

and changes in the natural habitats due to human activities in the last two hundred years. Activities such as land clearing for agriculture, mining and urban development, weed invasion and grazing altered environmental conditions. For example, in Victoria, grasslands used to occupy 10% of the state, but it is now reduced to <1% (Murphy *et al.,* 2008).

Conservation of "endangered" terrestrial orchids

There are two approaches

1. *In situ* conservation (on site conservation) – This involves conserving the orchids in their natural habitats which have been converted to Reserves and National Parks. For instance, turning rainforests into National Parks will conserve many epiphytes. However, re-introduction is needed if the orchid is already endangered, natural population is absent or too low;

2. *Ex situ* conservation - (off-site conservation) – conserving plants by cultivating them outside their natural habitats, e.g. in pots in case of the terrestrial orchids. While there are reservations about this approach, often known as "Conservation by Cultivation", it is better to have the plants in cultivation than to lose them completely (Lavarack, 1998).

In the case of threatened species, an integrated approach including both is necessary to ensure success (Swarts and Dixon, 2009).

I*n situ* conservation

Challenges facing *in situ* conservation

A. Role of mycorrhizal fungi

All orchids to varying extent are dependent on fungi. Much research has been carried out in Australia and worldwide on the fungal/orchid relation-ships of some of the native terrestrial orchids. It is now known that there are varying degrees of dependence of orchids on mycorrhizal fungi, from those which are capable of forming association with a wide variety of fungi, e.g. *Microtis* spp. to very highly specialized fungal association, as in the case of achlorophyllous mycoheterotrophic orchids, e.g. *Rhizanthella gardneri.* As shown in Figure 1, dependence on mycorrhizal fungi varies from on the one end of the scale, for those species which are dependent on the fungi for germination only, to the other end of the scale for those which are totally dependent on fungi for sugars and other nutrients.

The mycorrhizal fungi associated with some terrestrial orchids have been identified and it is now known that many of the green orchids are associated with a group of fungi known as the *Rhizoctonia* alliance (of which some are also found as saprophytes and plant pathogens) (Brundrett, 2007). It is therefore important, to be successful, the reintro-duction strategy of terrestrial orchids which are dependent on specialised fungi should include consideration for both the orchid plants as well as the associated fungal species (Thomson, 2010). New inoculation techniques which also involve the associated fungi are being developed (e.g. Sommerville

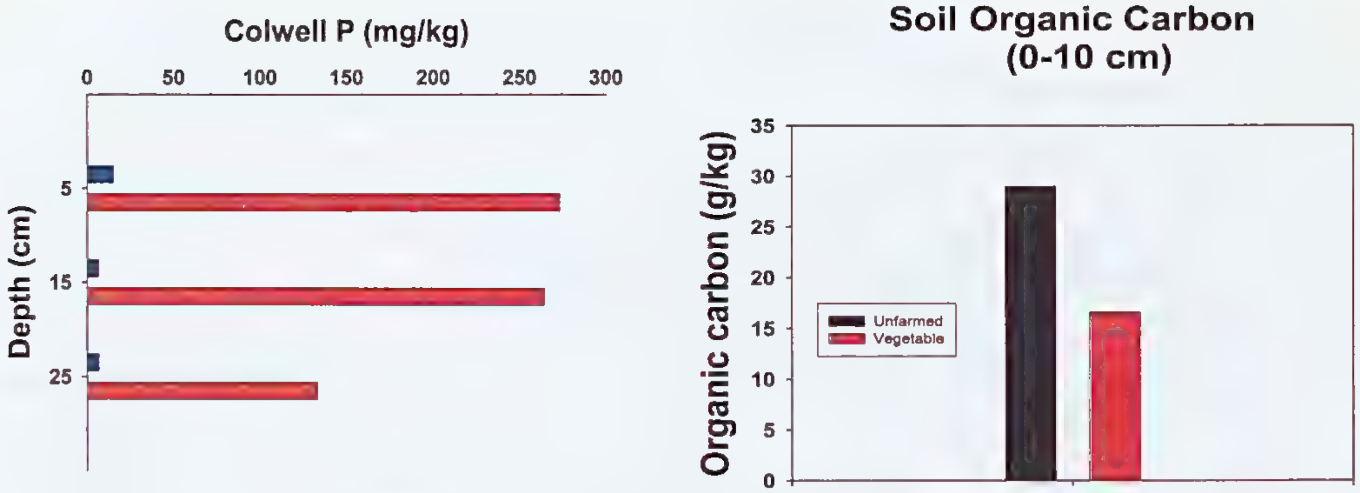


Fig. 2 Increase in soil phosphorus and decrease in soil organic carbon levels in vegetable growing soils compared to undisturbed soils in the Sydney Region (Chan *et al.*, 2007).

et al., 2008). In a process called encapsulation-dehydration, the orchid seeds and fungi are preserved as alginate beads and sown as a single entity in pots with proven success.

B. Habitat - loss and changes

While the consequences of a total loss of habitat to orchid survival are obvious (Lavarack, 1998), subtle changes to 'natural habitats' due to human activities can also hinder orchid existence and therefore success of their re-introduction to areas where they were once found. These changes include loss of natural pollinators in the habitats as well as changes to soil conditions.

It is obvious that in the absence of specific pollinators, chance of reproduction and eventual survival of the re-introduced population is zero. Hitherto, the implications of changes to soil conditions have not been taken into consideration in designing the re-introduction strategy. As a result of human activities, e.g. agri-cultural practices like grazing, pasture improvement, fertilizer application, weed invasion, clearing and altering fire regimes, soil properties of the habitats of terrestrial orchids could have been altered to the extent that they are no longer suitable for the orchids.

As an example of profound changes in soil properties under agriculture, soils in the Sydney region which have been under vegetable production, were found to have much higher phosphorus (P) but much lower organic carbon levels when compared to those under native vegetation (Chan *et al.,* 2007).

P level of soils which have been used for vegetable production was found to be >50 times higher than that under natural vegetation (Fig. 2). On the other hand, soil organic carbon level of the vegetable soils has been reduced to nearly half.

Liming to avoid soil acidification problem is a common agricultural practice which can alter soil pH. Grazing of pasture by introduced animals like cattle and sheep causes soil compaction and important changes in soil nutrient distribution.

These changes, which alter the physical, chemical and biological properties of the soil, can therefore potentially change the suitability of the habitat for orchid survival either directly by adversely affecting their growth and development processes or indirectly by affecting the associated mycorrhizal fungi upon which the orchids are dependent for survival. It is known that high soil P, as a result of fertilizer application, has an adverse effect on the abundance of mycorrhizal fungi (Curtis, 2004). Both the pH and soil P levels of many Australian soils have been profoundly altered as a result of agricultural activities with potential adverse effects on survival and growth of terrestrial orchids. However, many of these changes in soil conditions cannot be detectable by observation and require laboratory testing.

Re-introduction to 'natural habitats' - *progresses made*

There have been few reported examples of successful re-introduction of terrestrial orchids to field sites, particularly over the longer term (e.g. Batty *et al.,* 2006). Persistence of the translocated plants is the problem.

The Victorians, including members of ANOS (Victoria), have been leading the way in the area of terrestrial orchid conservation. ANOS (Victoria) together with a number of organizations, including Universities and Government Depart-ments were recipients of the Prime Minister's Banksia Award for the Environment in 2006 (Dilley, 2006) in recognition of their efforts and achievements in orchid conservation. Their work includes the re-introduction of the practically extinct terrestrial orchid *Diuris fragrantissima.*

We are using the re-introduction of *D. fragrantissma* (Smith *et al.*, 2009) as a case study of the challenges facing on-site conservation involving re-introduction of endangered orchid species.

Diuris fragrantissima, some say Victoria's most beautiful orchid, was once an abundant orchid on the grassy plains to the west of Melbourne but has suffered a catastrophic decline in range and abundance since European settlement. Only a remaining natural population of about 30 plants was found in one location, at Sunshine, over an area of 0.1 ha (Murphy *et al.*, 2008). Various attempts of re-introduction have been made in the last 50 years. However, prior to 2000, all the attempts to re-introduce *D. fragrantissima* were un-successful. In these earlier attempts, plants, seedlings and tubers were used but no inoculation of mycorrhizal fungi was involved.

In 2004/2005, 700 plants were re-introduced at one site (Altona site) and in some of the treatments, inoculation of the mycorrhizal fungi was included. Results so far:

1. Survival of re-introduced plants in all treatments declined at an average rate of 16.9% per years for 4 years after re-introduction;

2. No difference in plant number between the fungal treatment and the Control but it was higher in the (fungi +

soil aeration) treatment – results which question the usefulness of the fungal inoculation and highlight the importance of soil physical conditions;

3. Survival rate might be related to the different soil type (3 different soil types at the site). Soil compaction has been identified as a possible causal factor of re-introduction failure;

4. No seedling emergence has been observed so far.

The work is still continuing but so far has highlighted the complexity of the process.

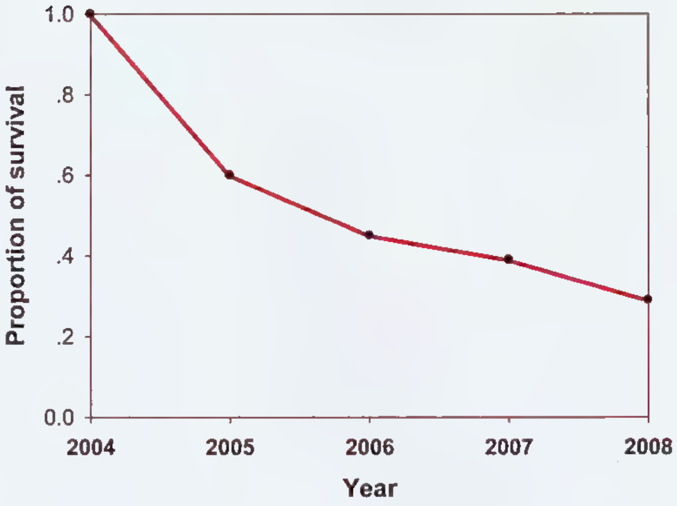


Fig. 3 Decline in population of re-introduced *D. fragrantissima* over a 4 year period.

Ex situ conservation

Merits of "conservation by cultivation"

1. May be the only avenue for the conservation of some orchid species, at least in the short term such as the case of permanent loss of natural habitat, or irreversible changes to habitat characteristics, e.g. *D. fragrantissima, Pterostylis hians;*

2. Can facilitate education, promotion of the conservation and support from the public – The ability to grow the orchids in pots successfully and promote them in shows and meetings will help to educate the public about the diversity and ecological significance of the orchids. This is important for gaining support from the community for conservation these orchids;

3. Provides support for *in situ* conservation – Successful cultivation of terrestrials *ex situ* can supply the large number of healthy advanced seedlings and/or tubers which are required for the re-introduction exercise (Thomson, 2010). This will also result in the accumulation of knowledge on the cultural requirements for the different orchid species. In turn,

this will help to secure better site selection and management, thus

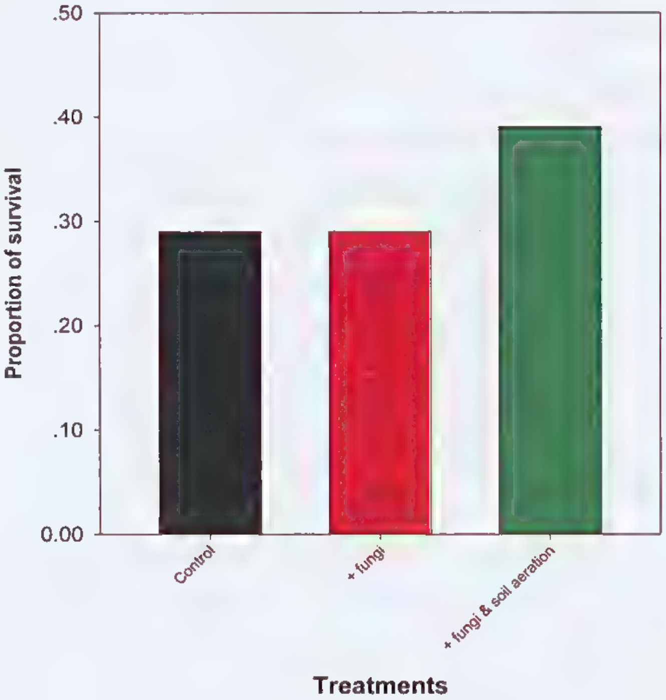


Fig. 4 Survival of re-introduced *D. fragrantissima* under different treatments.

ensuring better success in future re-introduction endeavours;

4. Leads to a reduction of illegal collection from the wild. This will require our ability to grow the orchids successfully and reliably in culture thus rendering the orchids more available.

It has been estimated that about 20% of Australian terrestrial orchids can be grown in pots without fungus (Nesbitt, *pers. comm.*). This means there are about 200 terrestrial orchid species (out of 1069 species in total (Jones, 2006)) that could be cultivated successfully in pots; only if we know how to do it properly.

Existing cultural methods for terrestrial orchids

It is evident that the current lack of interest on terrestrial orchids is partly due to the lack of good information on cultural methods. Much of the information currently available tends to be too generic and detailed information on particular species is often not available. In reviewing the literature, and through consulting current growers of terrestrial orchids, we have identified a few areas of potential improvement.

A. Potting mixes

Being terrestrial, these orchids are more dependent on soil (growth media) than the epiphytes for satisfying their requirements for growth and development and hence tend to be more affected by soil environment in terms of their requirement for water, nutrients and gaseous exchange. For this, both the composition of the potting mix, as well as the packing density of the mix needs to be considered;

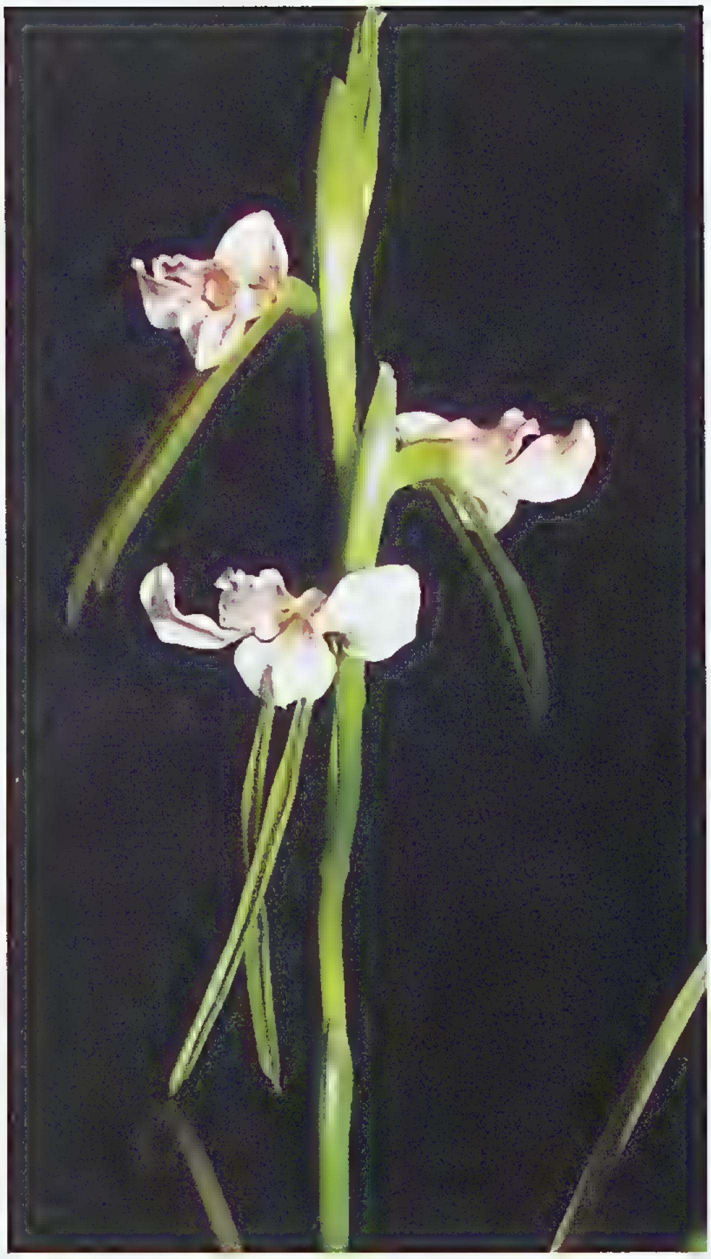


Figure 5. *Diuris fragrantissima* plant in cultivation.

1. Composition

Currently, the recommendation for composition of growth media tends to be very general. For example, one basic mix is recommended for all terrestrials, with only minor alterations in some cases for certain genera (Table 1). In the field, different species of same genus are

Table 1. Composition of potting media currently being recommended

Sources	**Composition**	**Remarks**	**Mycorrhizal fungi considerations**
Richards *et al.* (1998)	Coarse sand (2 parts); rich loam (1 part), buzzer chips (1 part), leaf mould (1 part) plus small amount of blood and bone and lime/ dolomite	- This is the basic mix for all orchids– except more sand for rufa group *Pterostylis* and more leaf mould for *Corybas* -Buzzer chips can be toxic; -P content of mix is not specified (controlled)	Half of the old mix retained and blended with the new mix to form next season's growth medium to facilitate carryover of necessary mycorrhizal fungi
Dash (*pers. comm.*)	Mountain loam, *Eucalyptus* chip, crushed basalt, coarse river sand and bush mulch in equal volume with little blood and bone and dolomite	-Basic mix for all orchids – except for *Corybas* use 1 Part extra of bush mulch and for *Caladenia* use 1 part extra of coarse sand -quality of mountain loam not specified but hopefully low in P	Mountain loam is collected from the bush, presumably from "natural habitat" of the orchids in question
Nesbitt (*pers. comm.*)	45% loam, 50% sand, 5% organic matter with little blood and bone	-One mix for all orchids. -Nature of organic matter not specified, - P content of loam not specified (controlled)	
Banks (1995) (John Riley terrestrial mix)	2 parts of coarse sand, 1 part of leaf litter, 1 part of hardwood shaving, 1 part of garden loam plus small amount of blood and bone and dolomite	-Very similar to Richards *et al.* (1998); -One mix for all orchids;	

often found in different substrates/ soils, e.g. different species of *Pterostylis* can be found in different soil types, *P. nutans* in sandy soil but *P. coccina* in loamy soils often derived from basalt; some *Diuris* on sandy soils while others on heavy soils (Bishop, 2000). Further refinement in potting media may be necessary to ensure better survival and growth of certain terrestrial orchid species.

2. Bulk density of potting medium (packing)

This determines the porosity as well as pore size distribution and can therefore affect infiltration and drainage as well as gaseous diffusion processes, all basic to the well-being of the orchids and the associated mycorrhizal fungi. The bulk density is dependent on the way the medium is packed as well as the nature and the decomposability of the potting media.

B. Nutrient management (fertilizer application)

Little information is available but the

general view is to discourage the use of fertilizer, particularly phosphorus fertiliser. The rationale is not clear but somehow related to an adverse effect on mycorrhizal fungi, probably for the same reason often given when growing other Australian native plants. However, this is now known not to be true and in commercial native flowers, such as New South Wales waratah (*Telopea speciosissima*), fertilizers are required to attain optimal productivity. Currently there is no clear guideline on fertilizer application strategy for the mycorrhizal independent terrestrials.

C. *Water management*

No comprehensive recommendation is available. General recommendations such as twice a week in summer and once every two weeks in winter are not very useful for specific species.

From actual field observation, different species within a genus are often found under vastly different water regimes and are expected to have different water requirements, e.g. *Pterostylis pulchella* vs *Pterostylis nutans.*

D. *Management of the mycorrhizal fungus (MF)*

For the fungal-dependent orchid species, improved management of both the plant and the fungus are needed to ensure persistence. Little attention is now paid to the requirements of the MF under cultivation of terrestrial orchids. Better and more reliable methods of MF inoculation are needed. Management of fungi during the dormant period of the orchids may be essential for overcoming the persistence problems so commonly encountered during cultivation of many terrestrial orchids in pots. Soil water regimes suitable for the fungi, and quality of substrate (organic matter) need to be considered. Inclusion of other host plants to benefit the fungi have been suggested (Rasmussen, 1995), part-icularly during the dormancy period of the orchids.

The way forward - Lessons from epiphytic orchids

A combined approach of both *ex situ* and *in situ* conservation will help the course of conservation of Australian terrestrial orchids. However, based on the above review, there are many areas of cultural method that need to be improved. For this, the lesson from successful cultivation of Australian epiphytic orchids should be learnt. Successful culture of many epiphytic orchids has led to their increased popularity amongst orchid growers and in orchid shows throughout the country and overseas. In retrospect, successful cultivation of epiphytic orchids has been firstly based on careful observations of the macro- and micro-environmental conditions of the natural habitats of the orchids. These conditions are then reproduced in the shade house or glasshouse. There have been a group of dedicated orchid enthusiasts who have been doing this over the last 40 years. Results of their experience have been published and therefore are available to the public as series of articles on cultivation of Australian epiphytes, including

- “Cultivation by habitat observations

- XXX" by Michael Harrison in various issues of *The Orchadian*
- "A bit about... XXX " by Gerry Walsh in various issues of *The Orchadian*

Similar efforts should be made for the terrestrial orchids. In contrast to the epiphytes, terrestrial orchids grow in the ground, better information on the prop-erties of the growth media (soils) are also needed. Soil conditions such as pH, nutrient level and compaction level are not visible and often require laboratory measurements.

Summary and Conclusions

1. Many Australian terrestrial orchids are under threat but hitherto have received little attention even amongst native orchid enthusiasts;

2. Current conservation has focused on on-site conservation and re-introduction of endangered species. Success so far has been hampered by a lack of knowledge on habitat requirements for the orchid as well as its mycorrhizal fungi, habitat changes in terms of soil properties, introduction methods and post introduction management;

3. Improving methods in pot culture will promote conservation of these orchids by (a) promoting these orchids to the public, (b) increasing knowledge of habitat requirements leading to better site selection and (c) providing the necessary advanced seedlings/ tubers for future re-introduction into "natural habitats";

4. There are areas of improvement for cultivating terrestrials – many can be gained by using "Cultivation by habitat observation" used in the past to improve epiphyte culture. However, soil character-ization is an important consideration for the terrestrials.

Acknowledgements

We would like to thank the following people for their kind advice and information during the preparation of this manuscript: Dick Thomson, Les Nesbitt, Fred Fear, Allen Dash, Karen Sommerville and Jim Lykos.

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Did You Know...?

ANOS Turns 50 in 2013! As a celebration of this we will bring you an array of articles about the early years of the Society from some of the more familiar names.

Let's make it a great party!

New Australasian Hybrid Registrations—September—October 2012

Dendrobium

Alwyn and Bailey	Den. Lady Hamilton x *Den. stratiotes*	B.Koch (O/U)
Ambrosian Jade	Den. Great Eastern x *Den. sutiknoi*	E.M.K-A.Chew
Amphion Delight	Den. [Doc.] Hot and Grumpy x Den. [Doc] Fifteen O Four	G.Dimos
Darlington Cascade	Den. Gracious Cascades x Den. Darlington Snow	H.A.Wilson
Darlington Dance	Den. Cherry Dance x Den. Aussie Ira	H.A.Wilson
Darlington Mist	Den. Darlington Snow x *Den. speciosum*	H.A.Wilson
Darlington Prince	Den. Aussie Virgin x Den. Aussie Ira	H.A.Wilson
Darlington Snow	Den. Grarose x *Den. speciosum*	H.A.Wilson (K.Russell)
Darlington Treat	Den. Esme Poulton x Den. Aussie Ira	H.A.Wilson
Dauntless Hero	Den. Masako Taki x Den. Lim Loong Keng	E.M.K-A.Chew
De Pentecost	Den. Henriette Bedie x *Den. lasianthera* [*ostrinoglossum*]	Pentecost (Neo Tuan Hong)
Fifteen O Four	Den. [Doc.] Anthedon Splendour x Den. [Doc.] Jake Noah	G.Dimos (Michael Harrison)
Hewitt River	Den. Graham Hewitt x Den. Allyn River	D.Cannon
Hirota Gem	Den. Hirota x Den. Classic Gem	R.Viraphandhu
Ingeburg Koch	Den. Constance x Den. Alwyn and Bailey	B.Koch
Janice Leong	Den. Amro x *Den. mirbelianum*	Koh Keng Hoe
José Maria Pereira Neves	Den. Shavin Ekapol x Den. Masako Kotaishi Hidenka	Singapore Bot.Gdns
Judi Martinuzzi	Den. Candy Cane x Den. Ted Davis	G.Valmadre
Julie Zepf	Den. Waianae Blush x Den. Anna Bibus	J.Grezaffi
Kasorn's Spry Jewel	*Den. cuspidatum* x *Den. venustum*	M.Chanyangam
Little Angels	Den. Triangel x Den. Hirota Gem	R.Viraphandhu
Lorna Massa	Den. Thailand White x Den. Autumn Carnival	J.Grezaffi
Marcelo Bejarano	Den. Anucha Flare x Den. Ekapol	Ecuagenera
Mikawa Eximi	Den. December Delight x *Den. eximium*	G.Kinbara
Mtn's Twilight Star	*Den. victoriae-reginae* x *Den. cyanocentrum*	MountainOrch.
Noel's Star	Den. Graham Hewitt x Den. Rutherford Starburst	N.Oliver (O/U)
Rosie and Chandra Das	Den. Tan Kheng Lian x Den. Claudia	David Lim
Shavin Ekapol	Den. Shavin White x Den. Ekapol	Singapore Bot.Gdns
Tania	Den. [Doc.] Green Gem x Den. [Doc.] Rosemary Jupp	Mrs.J.Dunn (O/U)
Tdares Angel Cake	Den. Sweet Cake x Den. Angel Baby	Tdares
Tdares Angel Emperor	Den. Angel Baby x Den. Red Emperor	Tdares
Tdares Angel Lake	Den. Hamana Lake x Den. Angel Baby	Tdares
Tdares Angel Love	Den. Angel Baby x Den. Mount Fuji	Tdares
Tdares Baby Smile	Den. Angel Baby x Den. Oriental Smile	Tdares
Tdares Fragrant Angel	*Den. aduncum* x Den. Angel Baby	Tdares
Tdares Sweet Angel	Den. Angel Baby x Den. Sweet Pinky	Tdares
Tdares White Carpet	*Den. heterocarpum* [*aureum*] x Den. Angel Baby	Tdares
Virginia Santos	Den. Sandy Natalie x Den. Sungwarn Onimsin	J.Grezaffi
Willowbank Princess	Den. Princess Sharon x Den. helix	Willowbanks
Willowbank Twist	Den. Brisbane River x Den. stratiotes	Willowbanks
Willowbank Wong	Den. Amy Wong x Den. Halawa Beauty	Willowbanks
Willowbank Zumi	Den. Kiyoshi Izumi x Den. Diane Kouchi	Willowbanks
Yan Yean Carmel (W.Turville)	Den. Victorian Flare x Den. Jesmond Sparkler	M.Mazza

Sarcochilus

Coolendel	Sarco. Cliona x Sarco. Roberta	N.Roper

Look what I found in my Backyard!!

Rick Winch (rickwinch@westnet.com.au)

Following the recent AOC Conference held in Perth in early September, I was fortunate to host Dennis and Di Cunningham, Bill and Lorraine Dobson and their daughter Barbara, with Alan Stephenson, on tours of our local Flora parks and reserves and Wine districts.

Only a short drive to the Par 3 Golf Course we discovered several species of terrestrial orchids that I had witnessed over a number of years flowering. I will leave it up to the reader or some other 'higher' authority to truly identify the orchids included in this piece.

The following I believe were identified using *Orchids of South West Australia* (3rd Edition, Hoffman and Brown).

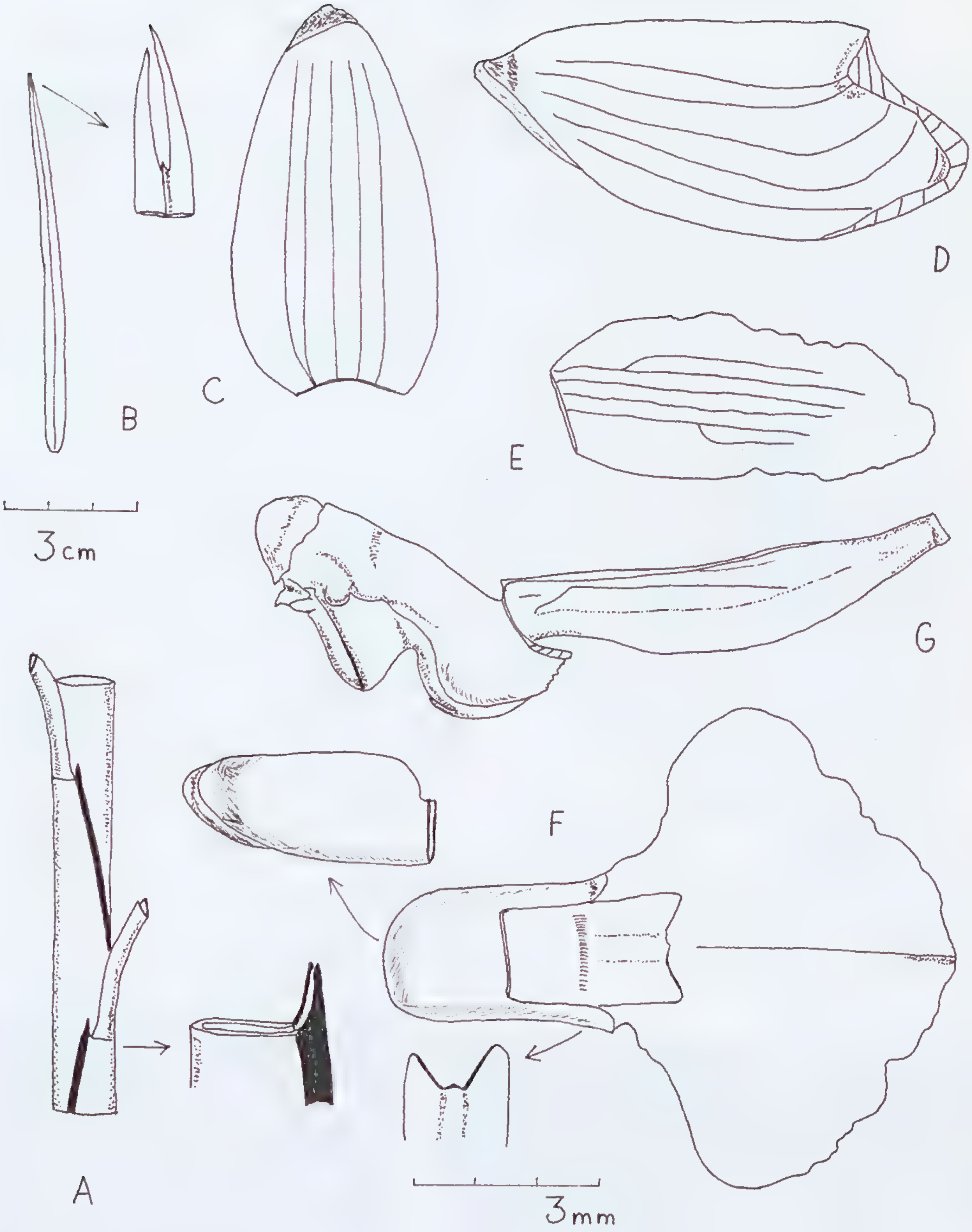
***Diuris* sp 'Dunsborough'**
Diuris *longifolia*
Diuris *amplissima*
Caladenia viridescens
Caladenia chapmanii
Caladenia flava
Caladenia reptans

Another short drive to Dunsborough to a small Park by the local Bowling Club named Blythe Park and what a surprise to find virtually on the road verge, a colony of *Diuris* with a population of over 80 flowering plants, a spectacle that Bill Dobson shot many photos of, getting 'down and dirty'!! looking like a rapper with his cap facing rearwards.

We then entered the Park and had to be very careful not to tread on the many flowering plants that included *Caladenia* and *Diuris*, along with other beautiful flora that is native to this area in abundance.

Several hours were spent walking the paths and into the undergrowth to explore one after another colony. All in all a very fruitful day's exploring with my visitors on three occasions, and then off to sample some of the food and wines for which this area is renowned.

Photographs by Rick Winch (the *Diuris* may be a natural hybrid with *D. amplissima*).



Agrostophyllum barkeri

A. stem section; B. leaf; C. dorsal sepal; D. lateral sepal; E. petal; F. labellum (hypochile side view and ligula arrowed); G. column and ovary.

A not to scale, B and C-F with respective scales. Drawn from holotype.

New Species of Papuan *Agrostophyllum* 5.

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ABSTRACT: Four new species and two new subspecies of New Guinean *Agrostophyllum* are described and illustrated. The new taxa are *A. barkeri*, *A. brassii*, *A. graminifolium* ssp. *rotundilabium*, *A. lisowskii*, *A. spinuliferum* and *A. spinuliferum* ssp. *misoense*.

Key Words: New Guinea, Agrostophyllum, *new species.*

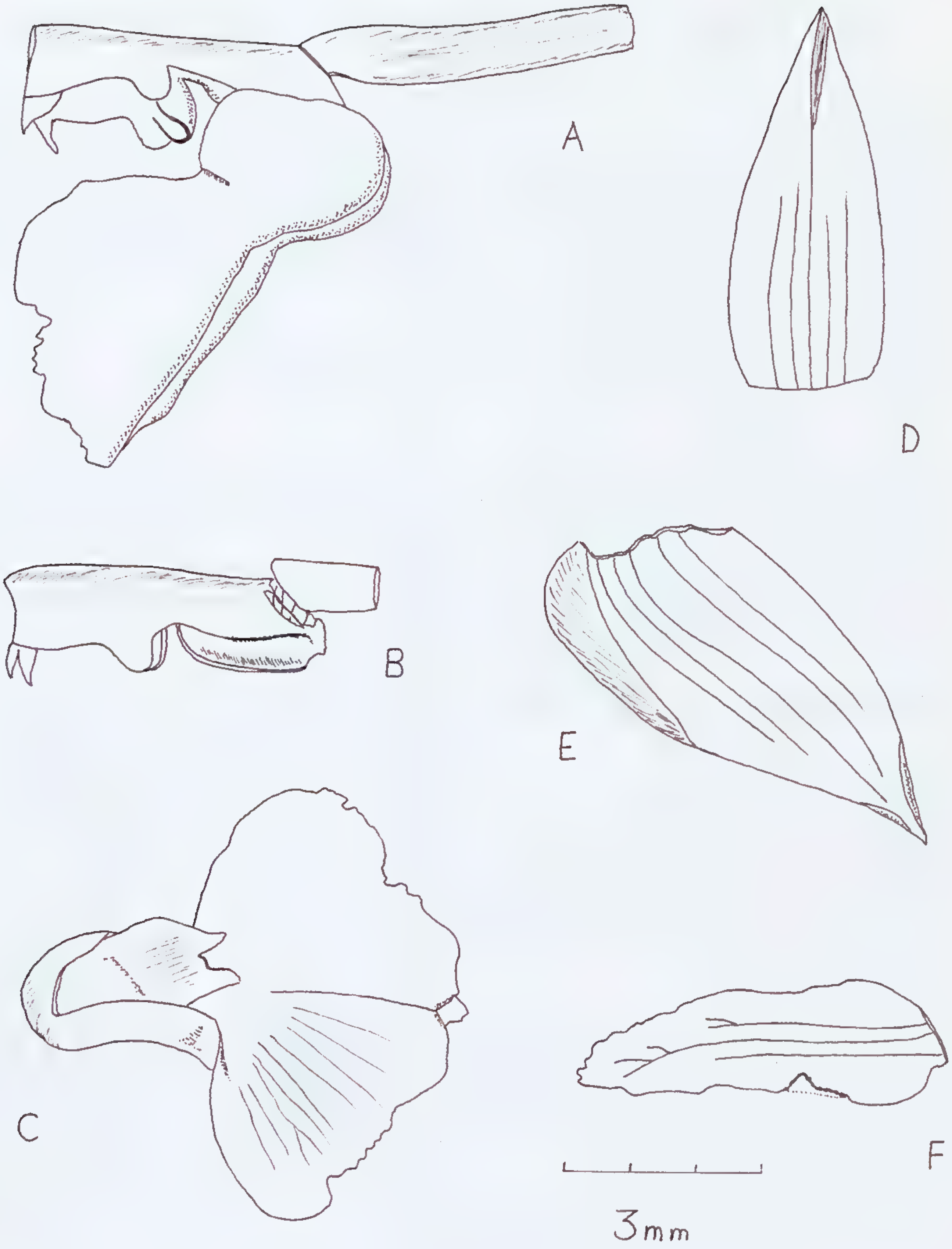
This paper continues on from the fourth part and herein describes four new species and two new subspecies of Papuan *Agrostophyllum*. This brings the number of species known from New Guinea to about 70.

1. *Agrostophyllum barkeri* Ormerod, *sp. nov.*

Type: Papua New Guinea, West Sepik Prov., Telefomin Subdistr., between Busilmin "airstrip" and Din River, 1400 m, 28 March 1975, *W.R. Barker LAE 66851* (Holotype: E!; Isotypes: A!, AD, BRI, CANB, K!, L!, LAE, M, NSW).

Affinis A. milneanum *Ormerod sed sepalis floribus obtuso-subcalceolatis (vs. subacuminatis), petalis oblongo-ellipticis (non lanceolatis) et columna brevioribus (2.5 vs. 4.5 mm) differt.*

Epiphytic herb. Roots terete, 0.5-2.0 mm thick. Stems caespitose, semiterete, sublaxly many leaved (leaves 1.3-1.9 cm apart), covered by leaf sheaths, 28.8-41.0 cm long, 0.08-0.10 cm thick near base, 0.20-0.35 cm wide across upper sheaths. Leaves linear-ligulate, apex biaristate, dullish dark green above, 41-125 mm long, 2.0-4.8 mm wide, tips 2-3 mm long; leaf sheaths black margined, open for three quarters of length to next sheath; stipules lanceolate, acute, 1.2-2.0 mm long. Inflorescence terminal, seminutant, composed of numerous bracts and sheaths, possibly successively one or few flowered, 13-15 mm long, 11-20 mm wide. Ovary pedicellate, obliquely fusi-form, angulate ribbed with narrow applanate wings, ca. 6.9 mm long. Flowers white with small yellow spot at lip (epichile?) base. Dorsal sepal ovate-elliptic, apex subcalceolate-obtuse, ecarinate, 5-veined, 6.6 mm long, 3 mm wide. Lateral sepals obliquely ovate-elliptic, apex subcalceolate -obtuse, apical third weakly carinate, 5-veined. 7.3 mm long basally, (6 mm along midvein), 3.8 mm wide spread (3.3 mm wide unspread). Petals obliquely oblong-elliptic, obtuse, 4-veined, 5.5 mm long, 2.4 mm wide. Labellum trilobed, 8.9 mm long; hypochile retrorse saccate-spurred, sidelobes rounded apically, ca. 3.5 mm long, 1.9 mm wide laterally, sac ca. 1.8 mm long; ligula subquadrate, widely bidentate; epichile obscurely trilobulate, transversely wide ovate-reniform, obtuse, ca. 4.9 mm long, 6.9 mm wide. Column obliquely erect, 3.1 mm long (2.5 mm long minus anther cap).



Agrostophyllum brassii

A. flower minus tepals; B. column; C. labellum; D. dorsal sepal; E. lateral sepal; F. petal.

A-F to scale. Drawn from holotype.

Distribution: Papua New Guinea.

Habitat: Montane rainforest, 1400 m.

Etymology: Named after William R. Barker, collector of the type.

This taxon is vegetatively similar to *A. milneanum* Ormerod but differs from it in having obtuse-subcalceolate (not subacuminate) sepals, oblong-elliptic (not lanceolate) petals, a less distinctly trilobulate labellum epichile and a shorter, stouter, erect (2.5 vs. 4.5 mm, slender, unraised) column.

Another similar taxon is *A. leucocephalum* Schltr. 1912 but it too has subacuminate sepals, oblong-lanceolate petals, a more distinctly trilobulate epichile and a subglobose (vs. conical, retrorse saccate) hypochile.

2. *Agrostophyllum brassii* Ormerod, *sp. nov.*

Type: Indonesia, Papua Prov., Bele River, 18 km NE of Lake Habbema, 2400 m, November 1938, *L.J. Brass 11461* (Holotype: BM!).

Species nova subsimilis A. graminifolium *Schltr. sed petalis floribus oblongo-lanceolatis (non oblongo-ellipticis), columna non-erectis (vs. oblique erectis) et gracilioribus (vs. validibus) differt.*

Epiphytic herb. Roots and rhizome not seen. Stems caespitose, preserved piece compressed, slender, 3 leaved, with internodes exposed for up to 6 cm, 10 cm long, 0.2 cm wide. Leaves linear-ligulate, apex tridentate, 19.8-21.3 cm long, 0.63 cm wide; leaf sheaths with black margins; stipules deltate, acute, short. Inflorescence terminal, composed of many bracts, sheaths and some flowers, 15 mm long, 23 mm wide. Ovary pedicellate, subterete, ca. 7 mm long. Flowers white, lip (epichile?) splotched with yellow. Dorsal sepal oblong-lanceolate, acute, apical third strongly carinate, 5-veined, 5.6 mm long, ca. 2.5 mm wide. Lateral sepals obliquely ovate-elliptic, acute, upper half moderately carinate, 5-veined, 6.5 mm long basally (6 mm along mid-vein), 2.9-3.3 mm wide. Petals oblong-lanceolate, apex irregular, 3-veined, 5 mm long, 1.75-1.80 mm wide. Labellum trilobed, ca. 6 mm long; hypochile shortly retrorse saccate, sidelobes broadly rounded, ca. 2.5 mm long, 1.9 mm wide laterally; ligula subquadrate, deeply wide bidentate, papillose-pubescent; papillose-pubescent; epichile trilobulate, widely rhombic-reniform, ca. 3.8 mm long, 6 mm wide, midlobule ca. 1 mm long, 2.9 mm wide. Column subclavate, with medial obtuse wings, ca. 3.8 mm long (minus anther cap).

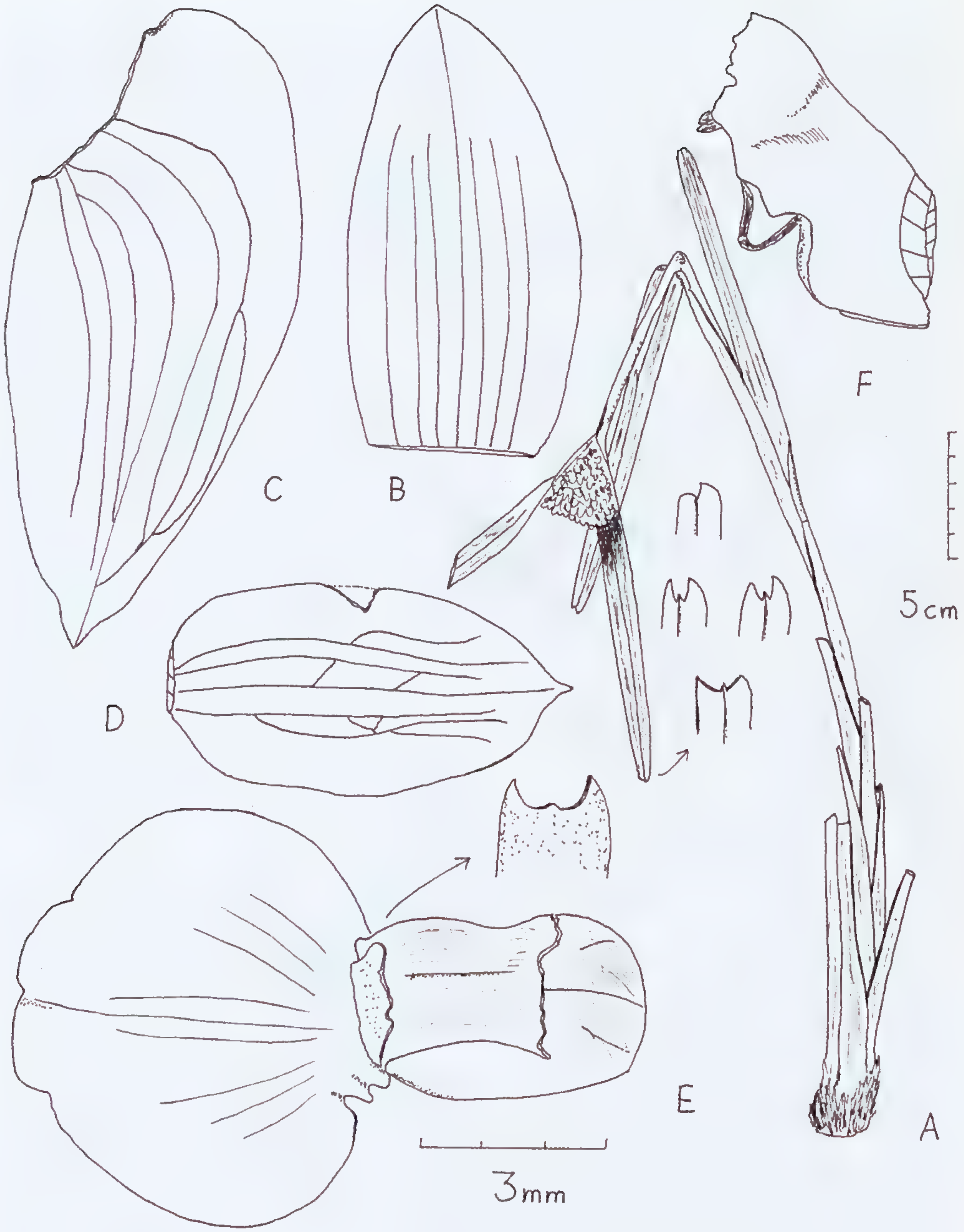
Distribution: Indonesia (Papua Prov.).

Habitat: Large clumps on mossy butts of trees, 2400 m.

Etymology: Named after Len Brass (1900-1971), collector of the type.

The collection *Brass 11461* is a mixture of two externally similar but different species. The sheets in AMES (holotype), BRI and L belong to *A. beleense* Ormerod whilst the duplicate in BM represents the new taxon described herein.

Agrostophyllum brassii is very similar vegetatively to *A. beleense* and *A. leucocephalum* Schltr. but differs from



Agrostophyllum graminifolium Schltr. Subspecies *rotundilabium*

A. stem; B. dorsal sepal; C. lateral sepal; D. petal; E. labellum; F. column.

A and B-F to respective scales. Drawn from holotype both of those taxa in its narrower, oblong-lanceolate (vs. oblong to oblong-elliptic) petals and more slender, unraised (vs. stouter, obliquely erect, rarely unraised) column. Its floral characters (such as oblong-lanceolate petals and slender column) remind one more of shorter leaved taxa such as *A. milneanum* Ormerod and *A. reeveanum* Ormerod.

3. *Agrostophyllum graminifolium* Schltr. subsp. ***rotundilabium*** Ormerod, *ssp. nov.*

Type: Papua New Guinea, Morobe Prov., Aseki Patrol Area, near Wengomanga, via Oiwa, 2180 m, 13 April 1966, *L.A. Craven & R. Schodde 1276* (Holotype: A!; Isotypes: BRI, CANB, K!, L!, LAE).

A subspecies typica foliis subcoriaceis et epichilo labello transverse ellipticis (non trapeziformis) differt.

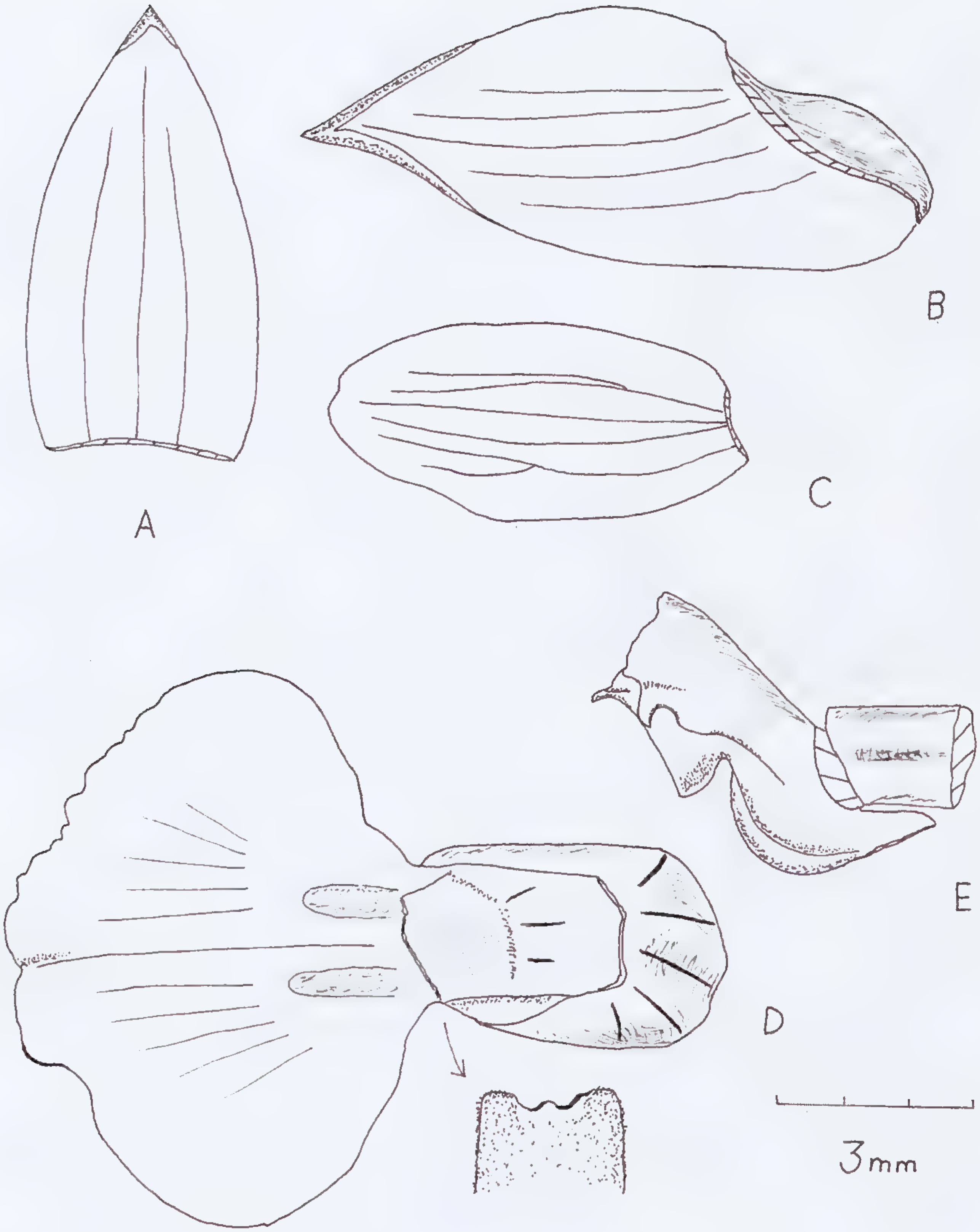
Epiphytic herb. Roots terete, 0.8-2.5 mm thick. Stems caespitose, compressed, 4-7 leaved, mostly clothed by sheaths but upper part with 2.0-13.5 cm of exposed internodes, to 42 cm (to 70 cm fide collectors) long, 0.3-0.5 cm thick, 0.75-1.65 cm wide across sheaths. Leaves linear-ligulate, apex equally to inequally bidentate, shortly apiculate, sub-coriaceous, dull midgreen above, paler below, 11.1-27.5 cm long, 0.85-1.10 cm wide, tips to 0.3 cm long; leaf sheaths with black margins, 2.2-7.0 cm long; stipules obliquely deltate, acute, to 3 mm long, usually 1-2 mm long. Inflorescence terminal, subglobose, composed of numerous bracts, sheaths and flowers, 2-3 cm long and wide. Ovary pedicellate, terete, 7-8 mm long. Flowers white. Dorsal sepal ovate-elliptic, acute to subacute, 3-7 veined, midvein low carinate in upper third, 5.9-6.8 mm long, 3.25-3.75 mm wide. Lateral sepals obliquely ovate, acute, 4-5 veined, midvein thick carinate in upper third, 8.9-9.5 mm long basally (7.95-8.50 mm medially), 4.6-4.8 mm wide. Petals elliptic, obtuse to acute, 4-veined, 5.75-6.00 mm long, 2.85-3.00 mm wide. Labellum trilobed, 8.9-10.0 mm long; hypochile retrorse saccate, sidelobes obliquely rotundate, 3.9-4.2 mm long, 2 mm wide laterally, 1.75 mm wide dorsally; ligula subquadrate, bilobed to bidentate, densely papillose-pubescent; epichile trilobulate, transversely elliptic, 5-6 mm long, 6.9-7.2 mm wide, midlobule transversely oblong-reniform, emarg-inate, 0.8-1.0 mm long, 3.0-3.2 mm wide. Column obliquely erect, semiterete, 2.75-3.20 mm long (minus anther cap).

Distribution: Papua New Guinea.

Specimens examined: Papua New Guinea, Morobe Prov., Kuper Range, Mt. Kolorong Wildlife Conservation Area, 2000 m, 12 May 1993, *R. Hoft 3579* (L);

2050 m, 13 May 1993, *R. Hoft 3604* (L); *same data, 3609* (A, L); 2020 m, 25 March 1993, *R. Hoft 3351* (L); 2050 m, 24 November 1992, *R. Hoft 2827* (L); same data, 2835 (L); 2250 m, 6 June 1992, *R. Hoft 2292* (L); Oegeramnang, 1785 m, 21 May 1937, *M.S. Clemens 6387* (AMES). Eastern Highlands Prov., Marafunga, 2775 m, 29 August 1963, *A.N. Millar NGF 15955* (K, L).

Habitat: Lower montane forest (type), midmontane forest with *Nothofagus*



Agrostophyllum graminifolium Schltr. Subspecies *rotundilabium*

A. dorsal sepal; B. lateral sepal; C. petal; D. labellum; E. column.

A-E to scale. Drawn from *Hoft 3579* (L).

pullei, N. carrii, N. grandis, Macaranga trichanthera, Rapanea leucantha and *Homalanthus* spp. (all Hoft no.'s), 1785-2775 m.

Etymology: From the Latin *rotundus*, round and *labium*, lip in reference to the rounded labellum epichile.

Agrostophyllum graminifolium subsp. *rotundilabium* differs from the typical subspecies in having leaves that are slightly more leathery and stiffer in appearance, also the flowers have a transversely elliptic (not trapeziform) epichile.

Agrostophyllum niveum Schltr. appears to be a very similar taxon to *A. graminifolium* subsp. *rotundilabium* but the former differs in having wider (12-14 vs. 8.5-11.0 mm) leaves, smaller flowers (sepals 5.6-6.5 vs. 5.9-9.5 mm long) and a smaller, entire epichile (3 x 4 vs. 5-6 x 8.9-10.0 mm).

4. *Agrostophyllum lisowskii* Ormerod, sp. nov.

Type: Papua New Guinea, Western Highlands Prov., near Mt. Hagen, from above Togoba, 2000 m, 4 September 1974, *S. Lisowski 54939* (Holotype: E!; Isotype: UGDA).

Affinis A. graminifolium Schltr. sed floribus rigidisepalis (non flexisepalis) et columna brevioribus (2.2 vs. 2.75-3.40 mm) differt.

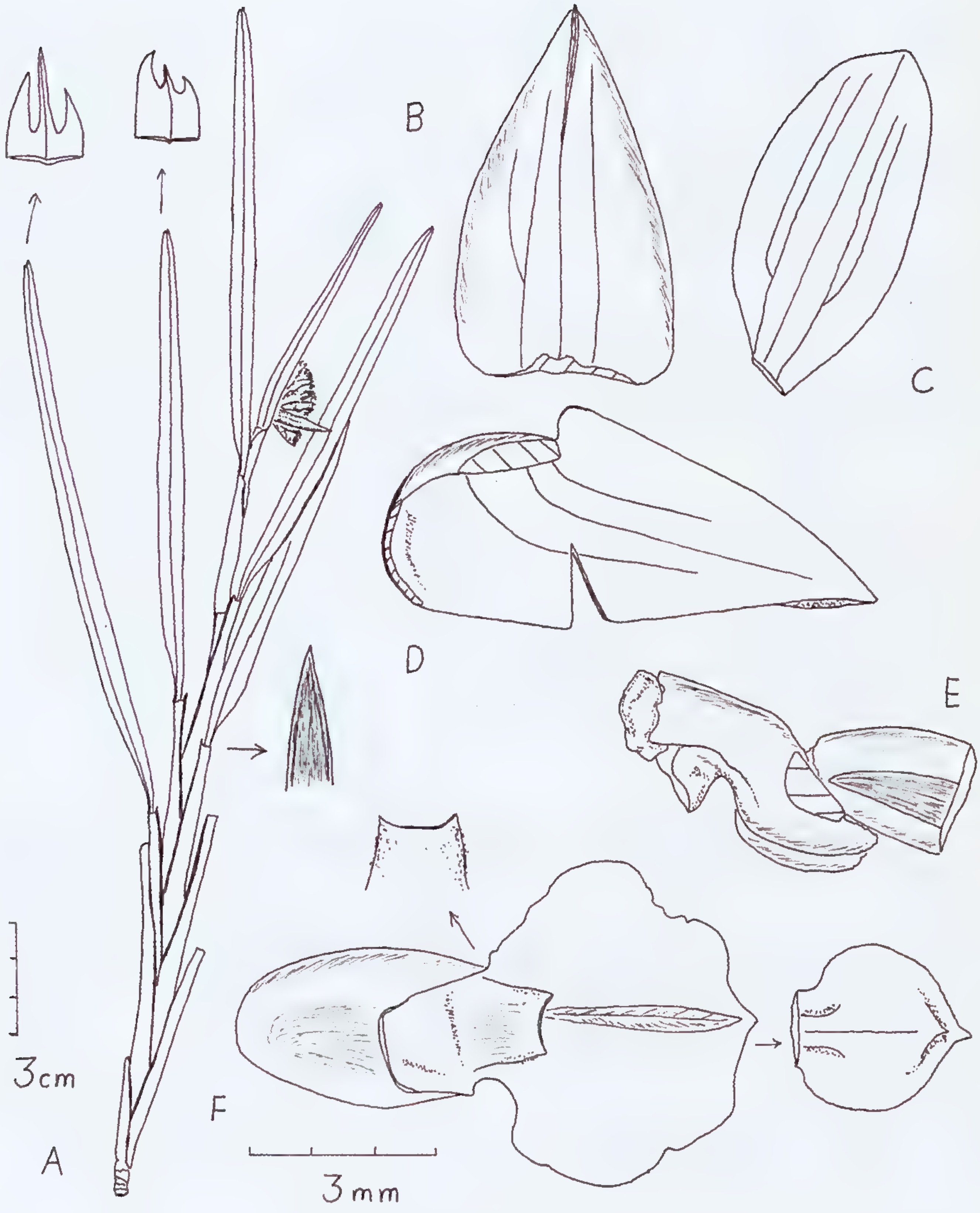
Epiphytic(?) herb. Roots terete, 1-2 mm thick. Stems caespitose, subterete basally, becoming complanate above, laxly 4-6 leaved, upper internodes exposed for 1.5-5.0 cm but lower half of stem (up to 10 cm) covered with old leaf sheaths, 13.5-23.0 cm long, 0.2-0.3 cm thick. Leaves linear-ligulate, apex inequally tridentate, 8.9-17.0 cm long, 0.40-0.55 cm wide, tips 0.09-0.10 cm long, mucro to 0.175 cm long; leaf sheaths with a black margin to 0.1 cm wide, exposed part 2.8-6.3 cm long; stipules lanceolate, acute, 3.0-.45 mm long. Inflorescence terminal, sessile, subglobose, composed of many bracts, sheaths and flowers, 14-20 mm long, 20-22 mm wide. Ovary pedicellate, fusiform-terete, 7.7 mm long. Flower colour unknown. Dorsal sepal ovate-deltate, acute, upper third carinate, 3-veined, 5.3 mm long, 3.25 mm wide. Lateral sepals obliquely ovate-lanceolate, acute, lower margin straight, upper third thickly carinate, 3-veined, 7.00-7.75 mm long basally (5.75-6.00 mm along midvein), 3.25 -3.80 mm wide. Petals obliquely oblong-elliptic, subacute, 3-veined, 5.1 mm long, 2.7 mm wide. Labellum trilobed, 8.75 mm long; hypochile oblongoid, retrorse saccate-spurred, sidelobes low, oblique, 4 mm long, 1.5 mm wide laterally, sac 2 mm long; ligula subquadrate-cuneate, widely bidentate-truncate, papillose-pubescent, rising past sidelobes by ca. 0.9 mm; epichile suborbicular (appearing trilobulate flattened), acute, fleshy, 4.75 mm long and wide. Column semiterete, slightly erect, ca. 2.75 mm long (2.2 mm long minus anther cap).

Distribution: Papua New Guinea.

Habitat: Montane forest, 2000 m.

Etymology: Named after Professor Stanislaw Lisowski (1924-2002), bryologist, specialist in Tropical African botany and collector of the type.

This species is externally identical to some



Agrostophyllum lisowskii

A. stem; B. dorsal sepal; C. petal; D. lateral sepal; E. column; F. labellum (epichile split; ligula and reduced undistorted epichile arrowed).

A and B-F to respective scales. Drawn from holotype.

forms of *A. graminifolium* Schltr. but its flowers differ in having rigid (vs. flexible) sepals that break upon being straightened or pressed, the lower margins of the lateral sepals are straight (not curved up toward the apex), an entire, suborbicular (in my drawing appearing trilobulate but this is an artefact of pressing the lip flat) (vs. trilobulate, rarely entire, trapeziform) epichile and a shorter (2.2 vs. 2.75-3.40 mm long minus anther cap) column.

5. *Agrostophyllum spinuliferum* Ormerod, *sp. nov.*

Type: Papua New Guinea, Western Highlands Prov., Ban Subdistr. Kwiona, 15 October 1969, *A.N. Millar NGF 38340* (Holotype: L!; Isotypes: BRI, CANB, K!, LAE).

Affinis A. kairoanum *Ormerod sed foliis erectis (vs. oblique erectis), stipulae longioribus (6.8-8.3 vs. 3-6 mm) et epichilo labello transverse oblongo-ellipticis (vs. late ovatis) differt.*

Epiphytic herb. Rhizome and roots not seen. Stems caespitose, subterete, brittle, covered by leaf sheaths, subdensely foliose (leaves 1.20-1.75 cm apart), 34.0-41.5 cm long, 0.20-0.35 cm wide across sheaths. Leaves linear-ligulate, apex inequally tridentate, erect, dark green, 72-83 mm long, 2.5-3.0 mm wide, tips 0.8-2.0 mm long; leaf sheaths black margined, nearly open down to next sheath apex, exposed part to 30 mm long, 1.0-2.5 mm wide laterally; stipules lanceolate, acute, 6.8-8.3 mm long. Inflorescence terminal, densely composed of many old bracts and sheaths but possibly only 1-2 flowered at a time, 20-25 mm long, 15-20 mm wide. Ovary pedicellate, terete, ca. 8 mm long. Flowers white. Dorsal sepal oblong-lanceolate, acute, carinate in upper half, 5 veined, 8.3 mm long, 2.75 mm wide. Lateral sepals obliquely oblong-lanceolate, acute, strongly carinate in upper third, 5-veined, 8.3 mm long basally (7.5 mm along midvein), ca. 3.2 mm wide. Petals obliquely ligulate-lanceolate, acute, 3-veined, 8 mm long, 1.8 mm wide. Labellum trilobed, 8 mm long (not including thick 0.8-0.9 mm long apiculus); hypochile shortly retrorse saccate, sidelobes broadly rounded, ca. 3.5 mm long, 2 mm wide laterally; ligula subquadrate, widely bidentate, papillose-pubescent, rising 1 mm above sidelobes; epichile trilobulate, trapeziform, base with 2 fleshy broad keels, ca. 4.8 mm long, 6 mm wide, mid-lobule transversely oblong-elliptic, ca. 1.5 mm long, 3 mm wide. Column semiterete, 4.75 mm long (minus anther cap).

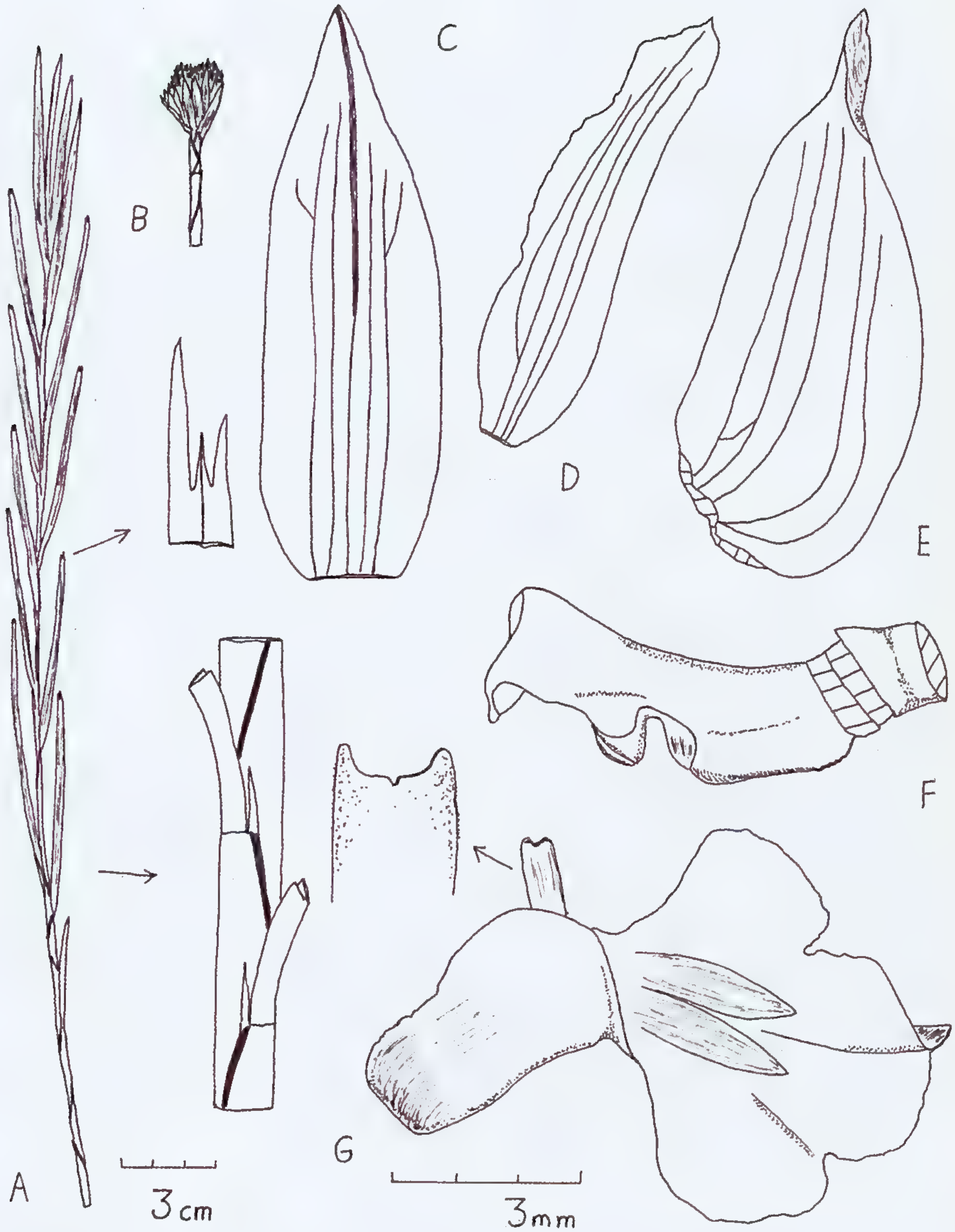
Distribution: Papua New Guinea.

Specimen examined: Papua New Guinea, Western Highlands Prov., near the road from Sari to the old government sawmill, Ecological Site 14, 2135 m, 13 February 1965, *J.R. Flenley ANU 2465* (A, K, L).

Habitat: Rainforest (type) and secondary growth (*ANU 2465*), 2135 m.

Etymology: From the Latin *spinula*, a small thorn or prickle, and the compound *–fer*, to carry, in reference to the prominent leaf sheath stipules.

This species may be recognised externally by its almost terete (usually flattened in *Agrostophyllum*) stems, erect leaves and long leaf sheath stipules. For this reason I have referred *Flenley ANU 2465* here though the duplicates so far seen lack flowers. The description given above is however based only on the type.



Agrostophyllum spinuliferum

A. sterile stem; B. inflorescence; C. dorsal sepal; D. petal; E. lateral sepal; F. column; G. labellum.

AB and C-G to respective scales. Drawn from holotype.

Agrostophyllum spinuliferum is probably most closely related to *A. kairoanum* Ormerod but differs from it in having more steeply erect leaves, longer (6.8-8.3 vs. 3-6 mm) leaf sheath stipules and a transversely oblong-elliptic (vs. widely ovate) epichile midlobule.

6. *Agrostophyllum spinuliferum* subsp. ***misoense*** Ormerod, *ssp. nov.*

Type: Papua New Guinea, Enga Prov., Lagaip District, Tumundan, Miso River, 2250 m, 29 August 1979, *T.M. Reeve 1141* (Holotype: K!; Isotype: LAE).

A subspecies typica sed foliis suberectis (vs. rigide erectis) et aliis columna recto-truncatis (vs. lobulatis) differt.

Epiphytic herb. Roots terete, ca. 1 mm thick. Stems caespitose, terete basally, compressed above, covered by leaf sheaths, sublaxly foliose in upper half (leaves 1.5-1.7 cm wide), 28-37 cm long, 0.15 cm thick basally, 0.25-0.50 cm wide across sheaths above. Leaves linear-ligulate, apex inequally to equally tridentate, obliquely erect, 39-88 mm long, 3.3-3.8 mm wide, tips 0.5-1.2 mm long; leaf sheaths with black margins; stipules subulate, acute, 2-7 mm long. Inflorescence terminal, basally enclosed by 3-7 distichous black margined sheaths that apically surround numerous bracts and sheaths, successively few flowered, 20-25 mm long, 8-10 mm wide. Ovary pedicellate, terete, ca. 6.5 mm long. Flowers white. Dorsal sepal elliptic, subacuminate, lightly carinate near apex, 3 veined, 7.2 mm long, 3.4 mm wide. Lateral sepals obliquely ovate-elliptic, subacuminate, thickly carinate at apex, 5-veined, 8.5 mm long basally (7.9 mm along midvein), 3.5 mm wide. Petals irregularly oblong, subacute, 3-4 veined, 6.5-6.9 mm long, 2.0-2.2 mm wide. Labellum trilobed, 8.2 mm long; hypochile with low-rounded sidelobes, inside with a low medial ridge, ca. 3 mm long, 2 mm wide laterally; ligula subquadrate, widely bidentate, papillose-pubescent, rising above sidelobes by ca. 1 mm; epichile trilobulate, ca. 5.2 mm long, 7 mm wide, midlobule semicircular, ca. 1.5 mm long, 3 mm wide. Column semiterete, 4 mm long (minus anther cap).

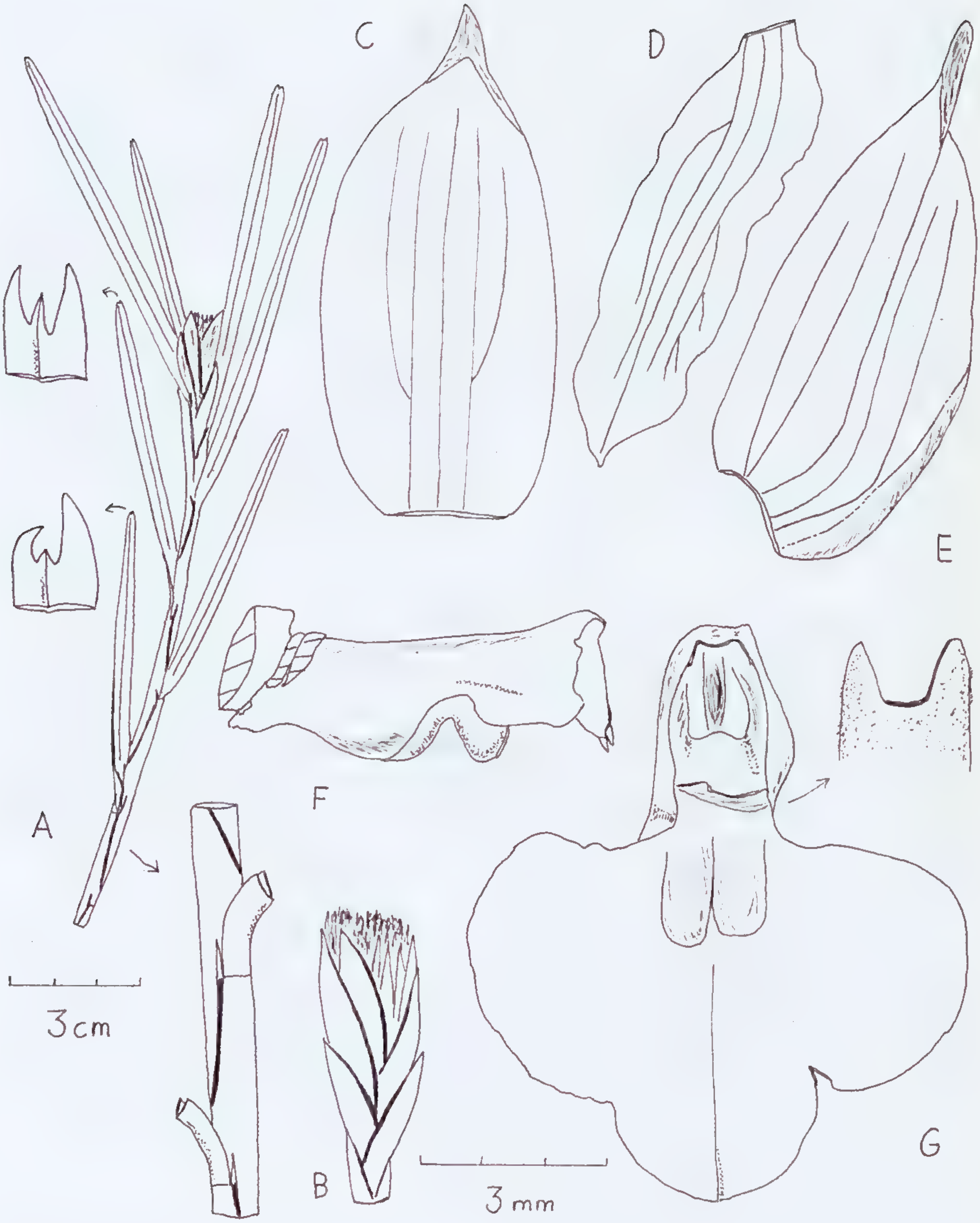
Distribution: Papua New Guinea.

Etymology: Named after the Miso River, the type locality.

This entity appears to be a subspecies of *A. spinuliferum* but differs from the typical taxon in having less stiffly erect leaves, narrower inflorescences and a column with straight (vs. lobulate) upper wings that have a truncate base.

Acknowledgements.

I wish to thank herbarium and library staff at the Harvard University Herbaria (A, AMES, GH) for their help and hospitality during my visits. BM, E, K and L kindly loaned specimens for study.



Agrostophyllum spinuliferum subspecies *misoense*

A. stem, upper part; B. more mature inflorescence; C. dorsal sepal; D. petal; E. lateral sepal; F. column; G. labellum.

A and C-G to respective scales. B not to scale. Drawn from holotype.

Dendrobium speciosum var. *grandiflorum* at the Kabi Spring Show.

Photograph by Jon Cara

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- **ANOS Mid-North Coast**: 69 The Lakes Way, Forster NSW 2428 - (02) 6554 9733.

Last Sunday each month, 12 noon, followed by BBQ. Contact secretary for location—Taree / Wauchope.

- **ANOS Newcastle**: PO Box 4021, Rathmines NSW 2283 - (02) 4975 3729.

4th Thursday each month, 7.30pm. John Young Community Hall, Thomas St, Cardiff.

- **ANOS Sydney**: 22 Rabaul Ave, Whalan NSW 2770 - (02) 8824 6338.

3rd Friday each month, 8pm. Senior Citizens Hall, B.H. Community Centre, Conie Ave, Baulkham Hills

- **ANOS Warringah**: PO Box 421, Forestville NSW 2087 - (02) 9943 0474

3rd Tuesday each month, 8pm. Community Hall, Starkey St, Forestville.

NEW ZEALAND

- **ANOS New Zealand Native Orchid Group**: 22Orchard St, Wadestown, Wellington

QUEENSLAND

- **ANOS Beenleigh**: PO Box 1130, Beenleigh QLD 4207 - (07) 3841 3330

1st Thursday each month, 7.30pm. Showground Hall, James St, Beenleigh.

- **ANOS Kabi**: PO Box 424, Aspley QLD 4034 - (07) 3359 5752

2nd Tuesday all months except January, 7.30pm. Bald Hills Memorial Hall, 2126 Gympie Rd, Bald Hills.

- **ANOS Mackay and District**: PO Box 138, Koumala QLD 4738 - (07) 4950 1065

2nd Thursday each month, Andergrove Community Centre, Celeber Drive, Andergrove.

- **ANOS Townsville**: 92 Curie St, Wulguru QLD 4811 - (07) 4778 4311

1st Tuesday each month, 8pm. Townsville Orchid Society Hall, Joe Kirwan Park, cnr Bamford Lane and Charles St, Townsville.

- **Native Orchid Society of Toowoomba**: PO Box 2141, Toowoomba QLD 4350.

1st Friday each month, 7.30pm. Lutheran Church Hall, cnr West and Alderley Sts, Toowoomba.

SOUTH AUSTRALIA

- **Native Orchid Society of South Australia**: PO Box 565 Unley SA 5061 - (08) 8294 8014

4th Tuesday each month, 8pm. St Matthew's Hall, 67 Bridge St, Kensington

VICTORIA

- **ANOS Geelong**: 2 Cooper St, Melton South VIC 3338 - (03) 9743 6040.

2nd Wednesday each month, 7.30pm, Uniting Church Hall, Moorabool St, South Geelong.

- **ANOS Victoria**: PO Box 345, Carlton North VIC 3054 - (03) 9387-2771.

1st Friday each month, 8pm. Toorak Uniting Church Hall, 603 Toorak Rd, Toorak (Melways 58 K4)

- **ANOS Melbourne Suburbs Group:** PO Box 169, Bayswater VIC 3153 - 0419 720 355.

4th Wednesday each month, 7.30pm. Montrose Primary School, Leith Rd, Montrose 3765 (Melways 52 D7)

WESTERN AUSTRALIA

- **ANOS Western Australia**: 27 Maidment Parade, Dalyellup WA 6230 - 0419 901 305.
- 2nd Monday each month, 8pm. Wilson Community Hall, Braibrise Rd, Wilson.

The Australasian Native Orchid Society Inc.

Products Available

ANOS Awards CD

- $20 plus postage
- CD containing award pictures and fact sheets for each award made by ANOS.

A Checklist of Australian Native Orchid Hybrids—9th Edition (2010)

- Hybrid checklist of all Australian Native Orchid Hybrids

Watercolour Drawings

Superb colour prints of J.J. Riley's drawings of Australian Orchids are now available in 3 sets of 8 different species each. **Each set is $15 plus postage**

- **Set 1**

Pterostylis maxima
Dipodium variegatum
Pterostylis daintreana
Pterostylis grandiflora
Cryptostylis erecta
Genoplesium filiforme
Diuris lanceolata
Rimacola elliptica

- **Set 2**

Pterostylis sanguinea
Pterostylis depauperata
Acianthus caudatus
Caladenia concinna
Chiloglottis truncata
Dendrobium kingianum
Sarcochilus australis
Dendrobium striolatum

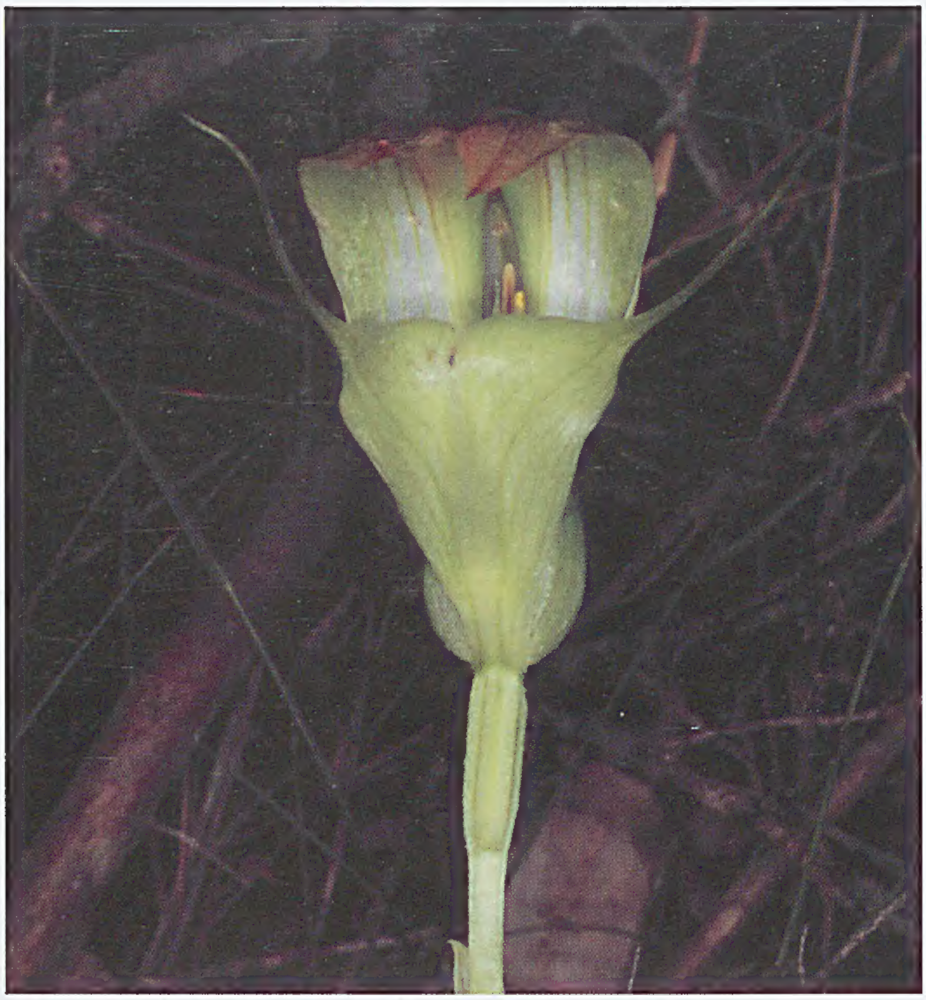
- **Set 3**

Dendrobium moorei
Lyperanthus nigricans
Dendrobium bowmanii
Eriochilus cucullatus
Pterostylis vittata
Sarcochilus ceciliae
Sarcochilus falcatus
Cymbidium canaliculatum

Contact the treasurer with regard to availability of these items and in order to arrange payment.

Meeting Planner: Each row is a week in the month—first at top, fourth at bottom. For instance, Macarthur and Districts ANOS meets on the 3rd Thursday each month.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
1st		Townsville		Beenleigh	Toowoomba Victoria
2nd	Western Australia	Illawarra Kabi	Central Coast Geelong	Mackay & District	
3rd		Warringah		Macarthur & District	Far North Coast Sydney
Mid-North Coast	*4th*	South Australia	Melbourne suburbs	Newcastle	



Pterostylis baptistii, phtographed by Jim Cootes near Nowra. Read the article about the flowering plants found on his trip to the Shoalhaven.

Cemetery site in the NSW Southern Highlands where mowing has stopped any of the local purple donkey orchid (*Diuris punctata*) population from flowering as it did here last year. See Alan Stephenson's article on the perils of maintenance.